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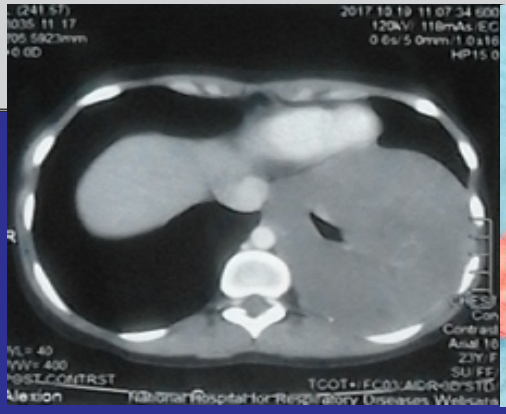

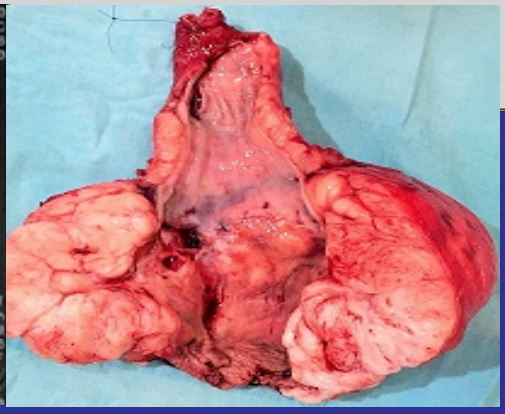

In this issue

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THE COLLEGE OF SURGEONS OF SRI LANKA
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A centre dedicated for men's health and wellbeing for the first time in Sri Lanka - End your suffering with an effective treatment for Erectile Dysfunction

Lanka Hospitals PLC, a premier health care provider in Sri Lanka, announces its latest addition to the Centres of Excellence- the Male Wellness Centre (MWC) – in a bid to offer services to improve health and wellbeing of men. It's also significant that a fully-fledged wellness centre dedicated solely for men has been established for the first time in Sri Lanka.

The MWC caters to a host of services including Personnel fitness scheduling and programming, Sport health and injury management, Dietary & Nutritional advices, Pre-marital counseling and health screening, Management of premature ejaculation, Management of Erectile dysfunction, Cosmetic surgeries (Bariatric / Ocular / Dental). In addition to the General health screening, patients can obtain screening for Liver, Kidney, Respiratory, Cardiac, Diabetic, Endocrine-Hormonal, Cancer and Sexually Transmitted Diseases in addition to Substances and Alcohol abuses. Furthermore, apart from leading physicians MWC offers the service of competent consultant specialists such as Cardiologist, Endocrinologist, Diabetologist, Venerologist, Urologist, Nephrologist, Oncologist, Surgeon, Vascular Surgeon, Psychiatrist as well as Counsellor.

Erectile Dysfunction (Impotence) is a common health issue suffered by men, defined by the difficulty in achieving and maintaining a penile erection during sexual intercourse. In the Sri Lankan context, the issue is hardly brought into light especially by those who suffer and often show reluctance to seeking proper medical attention. Often, incorrect and misleading advice not only aggravates the issue, but also lead them to face unwanted complications. A special Shock Wave Therapy unit was established within the Male Wellness Centre by the Lanka Hospitals to specifically treat impotence.

The Centre conducts in-depth studies and comprehensive medical analysis to precisely identify the causes for impotence such as Vascular, Psychogenic, Neurological, Hormonal, Structural and others. Being a newer and less invasive way to treat this common sexual challenge shock wave therapy has proven to be effective even when oral medication has failed. Also known as penile extracorporeal low-intensity shockwave therapy, this method involves the use of low intensity acoustic pulse waves that lead to release of factors which promote growth of new blood vessels in the penis Therapy compromises of a handheld device being angled towards the shaft of the penis. One of the main advantages of this treatment method is that it has no clinically relevant side effects. Each treatment session can last approximately 20 minutes.

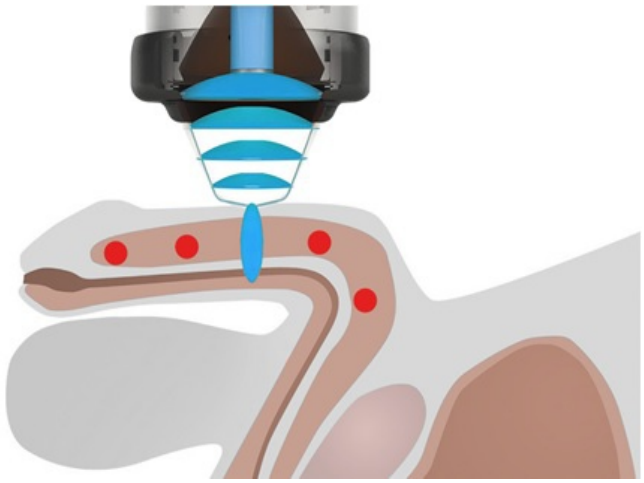

Figure 1. Shock wave therapy

Shock wave treatment is a completely painless way to treat what can be a life altering condition and a regular course of treatment usually comprises of six sessions. The frequency of these session can be tailor made as below and would be decided by the consultant:

1) Every day for 6 days
2) Every second day over an 11 day period
3) Twice a week for 3 weeks

The outcomes include gaining of more frequent erections, more rigid erections, ability to maintain an erection and perform entire act of sexual intercourse and freedom to reduce or omit medication. Therefore the use of a treatment which researchers claim is “really a breakthrough” could be good news for men who have erectile dysfunction.

As a hospital staying abreast with latest medical technology, Lanka Hospitals established Male Wellness Centre in a bid to provide world class health care services to Sri Lankan as well as International patients. Moreover, when catering to health issues and conditions that are highly sensitive and personal, Lanka Hospitals delivers complete confidentiality to its patients with the assistance of its specially trained staff.

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| MEN'S WELLNESS CENTRE |

Erectile Dysfunction Shockwave Therapy (SWT)

This process is designed for the treatment of erectile dysfunction of vasculogenic origin. The treatment is delivered with a first-of-a-kind system called the ED1000.

Advantages of Penile Shockwave Therapy

This procedure is a pain-free, non-invasive and non-pharmacological procedure that triggers a natural mechanism that solves most ED-related problems. There is lot of evidence to show very satisfactory outcomes of this therapy.

Protocol

- Each session duration: 20-30mins
- Usually performed twice a week for 3 weeks
- The sessions can be tailored on patient preference after discussing with the Consultant Genito-Urinary Surgeon or Physician

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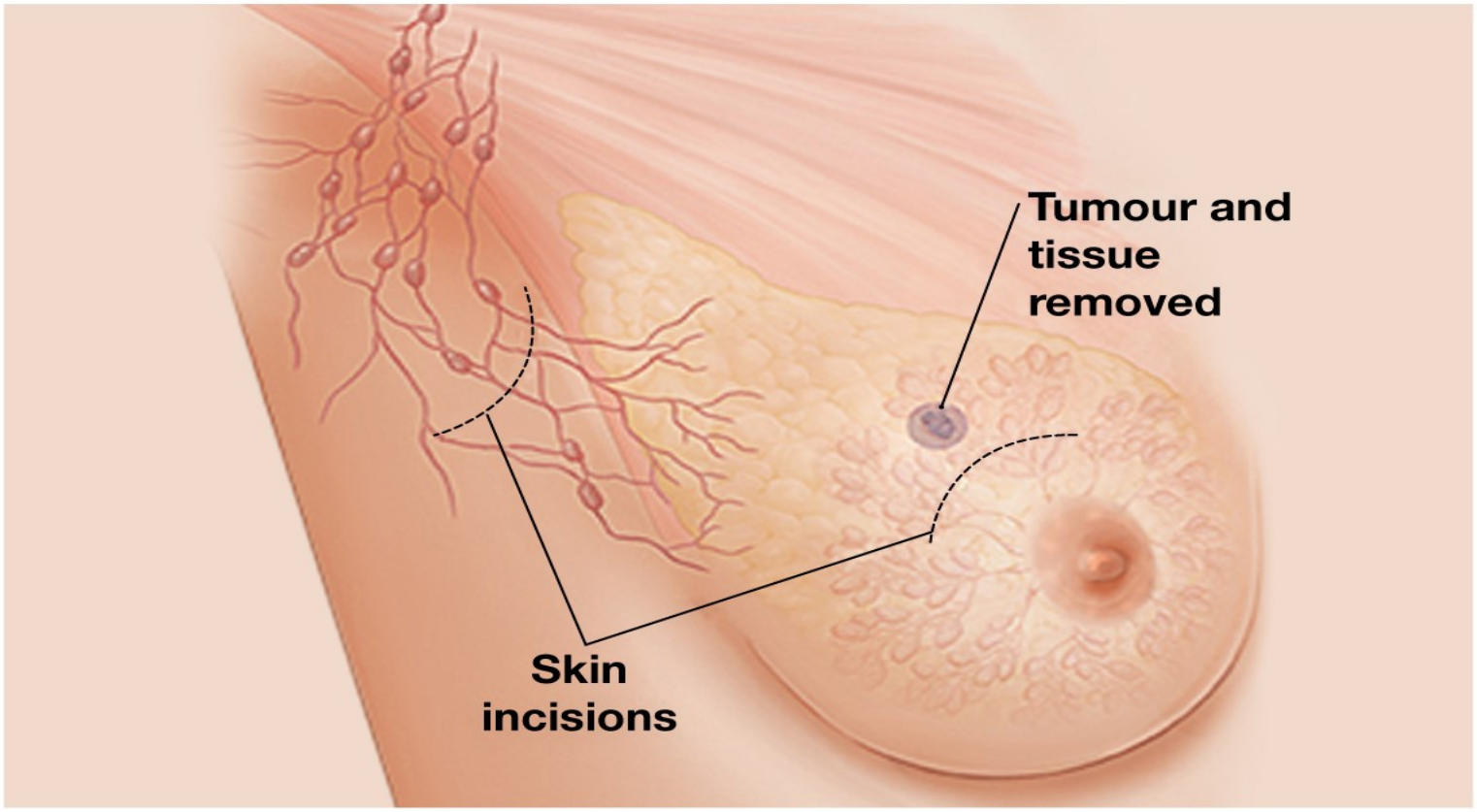

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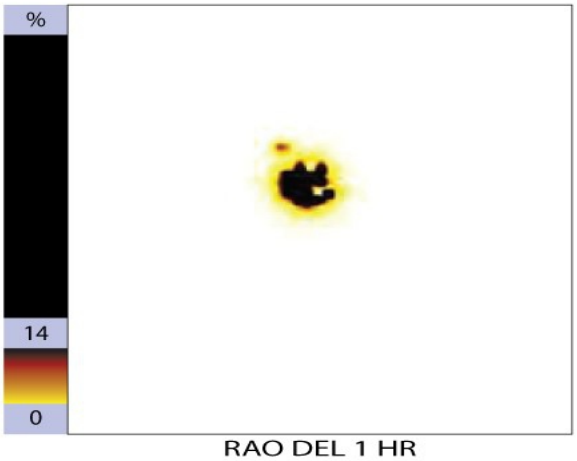

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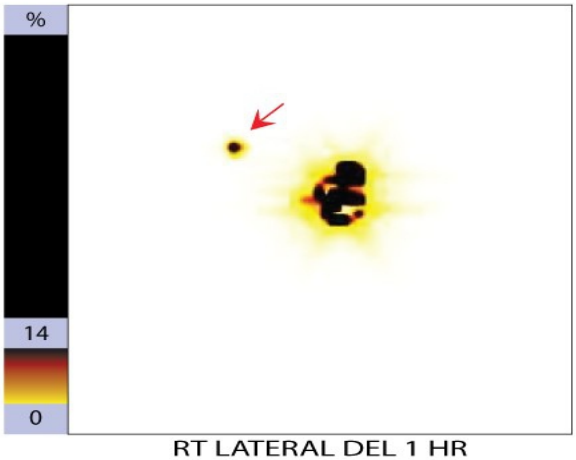

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Contents

SCIENTIFIC ARTICLE

Atherosclerotic occlusive arterial disease of the lower limbs: a historical account of surgical evolution and vascular reconstruction over thirty four years

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Key words: Chronic ischaemia; atherosclerosis; reconstruction

Abstract

This is a descriptive study of chronic ischaemia of the lower limb caused by atherosclerotic disease in 588 patients. The study was performed over 34 years in a tertiary clinic in the central province of Sri Lanka. It was found that the pattern of occlusions were similar to that of other reports on western patients. However, critical ischaemia was seen in 57% of Sri Lankan patients, suggesting a more florid disease. Pioneering efforts of reconstructive surgery in 278 patients and in-hospital results are presented.

Introduction

Historically, the angiographic patterns of lower limb occlusive arterial disease in Sri Lankans has been documented (1). The first documentation of reconstructive arterial surgery in Sri Lanka was by Sheriffdeen, in 1985 (2). In a previous study, our group reported the presentation and natural history of aortic atherosclerosis in Sri Lanka (3). It is essential to distinguish atherosclerotic disease from thromboangiitis obliterans (TAO), which presents in the young, an equally dominant arterial disease of limbs in Sri Lanka, where vascular reconstruction was mostly unrewarding (4). This report is an extended observational study of the presentation of atherosclerosis obliterans (ASO) of the lower limbs in Sri Lanka and our experience of vascular reconstruction. For historic purposes, short comings that we encountered in the early years are documented.

Patients and Method

Some 1316 patients with vascular claudication or critical ischaemia, i.e. skin ulceration, pre gangrene, or gangrene presenting to the Vascular Clinic of the University Surgical Unit at the Teaching Hospital Peradeniya, Sri Lanka were treated over a period of thirty four years (1974-2007). Of 1316 patients, 588 were evaluated on a prospective basis and form the basis of this report. The study comprises two parts; presentation of atherosclerotic arterial disease of the lower limbs from 1974 to 1993 that was recorded on a prospective basis in 588 patients (group A), and the result of lower limb arterial reconstruction in atherosclerotic occlusive arterial disease in a subset of 278 patients (group B). Records in which data were incomplete were excluded from further study.

ASO was diagnosed if the onset of ischaemic symptoms was later than 50 years. Also, ASO was diagnosed in those with first presentation of symptoms less than 50, if there were primary ASO risk factors (smoking was not weighted), there was evidence of systemic ASO, and in those who did not have features of TAO like upper limb arterial occlusive disease superficial thrombophlebitis in non-varicose veins, were classified as ASO. The diagnosis was reinforced by angiographic, operative appearances and histological data of thrombo-endarterectomy specimens or from dissected vessels of amputated limbs. Reconstructive arterial surgery was performed for claudication that handicapped the patient and for critical ischaemia. Systemic atherosclerosis complicated by ischaemic heart disease and cerebrovascular ischaemic manifestations in patients were comprehensively evaluated before surgery was offered. Morbidity and mortality in hospital was recorded and surgical intervention was considered a success if patients' symptoms regressed and claudication distance improved. In those with critical ischaemia, if foot ulcers healed and when digital and forefoot amputations, which were undertaken for gangrene, had healed enabling limb sparing. All data recorded were subjective, there was no objective evaluation as the concept of a vascular assessment laboratory developed in the latter most part of this audit.

In the early part of our work, lack of timed films on angiography which, at times, resulted in poor visualization of the run off and the lack of prosthetic grafts was a technical handicap. Also, serum lipid profile analysis was not available in our early experience. Patients' data, which included angiographic evidence, were entered into a spread sheet that enabled computerised analysis. Ethical clearance for this study was obtained from the Ethics Committee of the Faculty of Medicine, University of Peradeniya.

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Results

Group A

Patients with ASO were categorized, based on the age of origin of symptoms, as follows; < 35 years, 36 to 49 and > 50 years. Based on clinical and angiographic assessment, disease was classified as aorto-iliac (AID), femoro-popliteal (FPD) and tibial arterial disease (TD). Table 1 shows the age at presentation and the level of arterial occlusion based on clinical and angiographic data. Some 334 (57%) of 588 patients presented with critical ischaemia. Furthermore, a high prevalence of critical ischaemia (46%), was observed in those > 50. Tobacco smoking was reported in over 80 percent of our patients across all age groups while hypertension was a co-morbid factor in those young patients, <35 years, with atherosclerotic arterial occlusive disease (table 2). Diabetes mellitus, hypertension and hyperlipidaemia were other co-morbid features that were seen in our patients. Overall, features of systemic atherosclerosis were seen in 17 percent of patients <35 years and up to 21 percent of patients >35years (table 3).

Subset analysis of reconstructive arterial surgery for ASO of the lower limbs – Group B.

The pattern of lower limb occlusive arterial disease that required reconstruction in 278 patients is shown in table 4. For clarity, surgical reconstruction has been presented as either aortic and aorto-iliac reconstruction or femoro-popliteal and tibial reconstruction.

Aortic and aorto-iliac reconstruction

The demography of the group requiring aortic and aorto-iliac reconstruction is presented in table 5. Figures 1 to 4 depict the levels of aortic occlusive disease and indicate the quality of images we obtained in the early years of vascular imaging. Based on angiograms, those with occlusion in the aorto- iliac segment were further classified into juxta renal, sub-renal, distal aorta, not involving the bifurcation, and disease involving the aorta and its bifurcation.

The "run-off" in aortic occlusions

Analysis of angiograms revealed that the run off was satisfactory in the iliac and/ or common femoral arteries in all of the juxta renal group except in two where there was multi segmental disease, with distal superficial femoral artery patency. In those with low aortic occlusive disease there was a good run off in the iliac arteries except in six of the 31 cases analysed. These patients had an associated distal occlusion- 2 with external iliac and 4 with associated superficial femoral artery occlusion. All patients with critical stenosis of the aortic bifurcation had multi-segment disease- 14 with external iliac artery occlusions and 9 with associated superficial femoral artery occlusions. Reconstructive surgery was possible in all of these patients.

Surgical intervention

Surgical reconstruction comprised of combinations of aortic replacement by graft, thrombo-endarterectomy and / or venous patch angioplasty. Aortic grafts were either straight grafts or an aorto-bi-femoral prosthetic graft depending on whether disease involved the common iliac arteries. The non-availability of prosthetic grafts in the early years was the reason we adopted extensive use of thrombo-endarterectomy and vein patch angioplasty. In later years, when grafts became available, graft reconstruction evolved as the dominant procedure (5). Tables 6 and 7 indicate the type of reconstruction and its result. Surgical reconstruction was possible in 182 (73%) of two hundred and forty nine patients with aorto- iliac disease. In the remainder, surgical reconstruction was not possible due to patients not giving consent, non-availability of grafts, associated co-morbidity and gross sepsis of the feet with inguinal lymphadenopathy, despite antibiotics, which precluded use of a graft. It is noteworthy that our results are comparable with other contemporary series (5, 6). Complications of aortic reconstruction were; graft to limb embolus that required embolectomy in 5; groin bleed from a false aneurysm in 1, groin wound sepsis -1, leakage of lymph-1 and ventricular ectopics -1. Causes of death in the post-operative period were renal failure in 2 patients, coeliac axis ischaemia and bowel infarction - 1; sudden death in 3 patients, thought to be due to a myocardial cause or intra peritoneal bleed (as post mortems were not undertaken), and in one patient, graft occlusion that presented one year later with critical ischaemia leading to major amputation and death.

Common and external iliac artery reconstruction

The common iliac segment of the aorto-iliac arterial tree was often associated with aortic bifurcation atheroma though, in some, only the common iliac artery was either stenosed or occluded in isolation (Fig. 5). However, bilateral disease was not uncommon. Although the outflow path was compromised by further extension of an occlusion, a run off was often found downstream as shown in table 8. The symptomatic limb arteries were invariably reconstructed except in bilaterally symptomatic cases where a bifurcation graft was used for bilateral external iliac artery pathology in 6 patients. The inability to show a run off in 22 cases was chiefly due to technical reasons, since in the early years, "syringe needling" was used to identify patency of the run off in some cases.

In the early years localized thrombo-endarterectomy was performed but in the latter years, if the ankle brachial pressure index (ABPI) of the donor limb was above 0.7, cross over grafting was performed to preserve the aortic bifurcation area for possible future surgery (7). If the (ABPI) was <0 .7 in the donor limb, a direct graft was attached to the aorta. If the common femoral artery bifurcation was occluded, which was often present with external iliac artery occlusive disease, a profundoplasty or extended profundoplasty was undertaken

Table 1. Presentation of patients with occlusive arterial limb disease based on the age group at the onset of symptoms

Age group in yrs. ; AO (n =)		<35 (n = 36)			36-49 (n =112)			50 and + (n=438)		
Degree : ischaemia		C	CI	MA	C	CI	MA	C	CI	MA
PLO*	N=									
AID	249	3	10	2	21	33	9	109	60	2
FPD	253	1	14	2	4	20	2	110	93	7
TD	86	0	4	0	5	18	0	17	42	0
TOTAL	588	4	28	4	30	71	11	236	193	9

C= claudication, CI=critical ischaemia MA=major amputation i.e. AK/BK.

*PLO- Pulse level of occlusion - AID= aortoiliac disease, FPD=femoro-popliteal disease, TD=tibial disease.

Table 2. The prevalence of primary risk factors for atherosclerosis in patients

ATHEROSCLEROTIC RISK FACTORS AMONG PATIENTS WITH ASO						
Age groups in yrs. (AO)	n=	Diabetes %	Hypertension %	Smoking %	Hyperlipidaemia n / n*	%
<35	36	6	71	98	8/29	28
35-49	112	7	45	98	61/108	56
>50	440	18	40	88	33/61	54

* Number of patients investigated

Table 3. The prevalence of systemic atherosclerosis in patients with occlusive arterial disease of the limbs.

SYSTEMIC ATHEROSCLEROTIC DISEASE - PREVALENCE			
Age groups in yrs. (AO)	n=	MI/HF	STROKES
<35	36	1/3	2
35-49	112	9/2	13
>49	440	33/17	38

MI: Myocardial Infarction. HF: Heart Failure

Table 4. Overview of the types of lower limb occlusive arterial disease requiring reconstruction.

Level of Occ: artery	N =
Aortic	93
Common iliac	76
External iliac	13
Common femoral bifurc:	8
Fem:-Popliteal & Fem- tibial	88
Total	278

Table 5. Demography of 182 patients who underwent aortic or aorto-iliac reconstruction.

Aorto-iliac atherosclerotic occlusive disease Group B n=182 Table 5				
DEMOGRAPHY AND PRESENTATION OF AORTO-ILIAC OCCLUSIVE DISEASE				
CRITERION	HIGH AORTIC OCCLUSION	LOW AORTIC OCCLUSION	AORTIC BIFURC: CRITICAL STEN:	COMMON & EXTERNAL ILIAC OCC:
n =	32	31	30	89
Mean Age/SD	48.3/10.1	44.8/9.2	55 .4.5	45.6
.M:F	31 : 1	29 : 2	26:4	88:1
% Diabetes	0	0	2.6	4.4
% Hypertension	22.2	17.4	26.1	30.9
% Hyperlipidaemia	81.8	100	?	37.5
%Claud:/Crit : Ischaemia	97/3	87/13	68/32	47/53*

Claud: claudication **Crit:** critical ischaemia

Table 6. Result of 182 aorto-iliac reconstructions for occlusive atherosclerotic disease

Reconstructions for ASO aorto-iliac occlusive disease					
	n=	TE	V/Grafts	Good result	Deaths
Aortic occlusions	63	4	59	58	4
Aorto-iliac critical stenoses	30	18	12	25	3
Aortic ASO with Common Iliac occlusions	76	37	39	62	3
External –iliac Occlusions	13	3	10	7	2

* Indicates unknown outcome in some patients.

TE- Thrombo-endarterectomy; V/Graft: Vein or graft patch angioplasty or graft bypass

Table 7. Type of aortic reconstruction and result in 93 patients

Levels of Aortic atherosclerotic Occlusions and their Reconstructions					
Level of occlusion	Number	TE+PA	Grafts	Success	Death
Juxta renal (JRAO) Fig. 1	31	0	ABF-31	29 *	1
Sub renal (SRAO) Fig. 2	01	0	ABF-1	1	0
Low aortic (LAO) Fig. 3	31	7	ABF-24	28	3
Aorto-iliac critical stenosis (AICS) Fig. 4	30	21	ABF-9	25*	3
Totals	93	28	ABF-65	83	7

*Indicates that in some patients outcome data were not available.

TE+/-PA - Thrombo-endarterectomy patch angioplasty; ABF- Aorto-bifemoral prostheses.

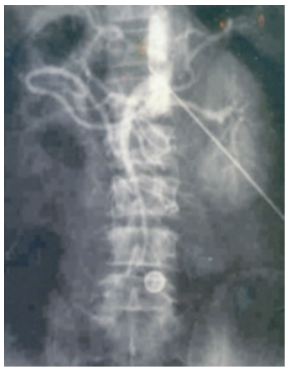

Figure 1. Juxta renal stenosis

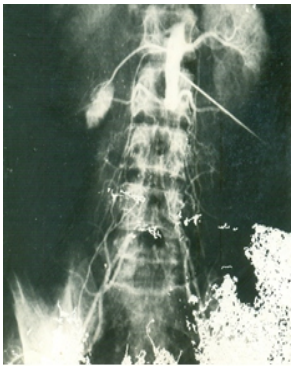

Figure 2. Sub-renal

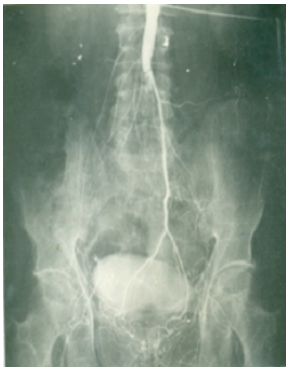

Figure 3. Distal aortic

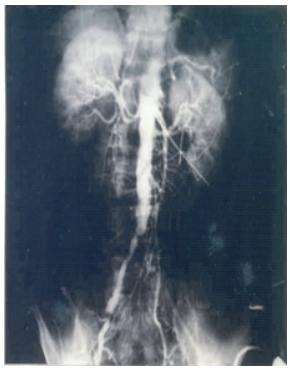

Figure 4. Aortic bifurcation

Figures 1 to 4. Images of angiography undertaken in patients with occlusive arterial disease secondary to atherosclerosis indicating the levels of aortic involvement.

Table 8. The pattern of run-off in 76 limb reconstructions for common and external iliac artery disease

Level of patent arterial segment	Bilateral	Unilateral
Bifurcation	3	5
Common femoral	8	20
Common femoral	8	5
Mid superficial femoral	1	3
Distal superficial femoral	8	15
No run off	-	-
	28	48

comprising thrombo-endarterectomy with a patch of vein or prosthetic graft – table 9. Complications of common iliac and external iliac reconstruction included, abandonment of the procedure because of a grossly calcified aorta and iliac vessel complex, post-endarterectomy vessel occlusion leading to below knee (BKA) and subsequently an above knee (AKA) amputation in 2 patients; one died of renal failure and another due to myocardial infarction. Other complications included iliofemoral graft occlusion requiring embolectomy -1, false aneurysm in 1, adhesive intestinal obstruction -1 and inguinal wound sepsis.

Femoro-popliteal and tibial artery reconstruction

Common femoral reconstruction

In general, surgical reconstruction for infra-inguinal arterial disease was confined to disease of the femoral artery and that of the arteries in the proximal part of the leg. Reconstructive surgical intervention was not undertaken at that time for distal tibial artery and distal vessel occlusion. Instead, these patients were treated by non- operative methods, such as a program to increase claudication distance, reduction in smoking, control of co-morbid disease such as hypertension and diabetes and, if required, distal amputation. Surgical reconstruction of the common femoral artery in isolation that was undertaken for critical ischaemia, owing to ease of access, in our experience, yielded poor results (table 10). This was mostly due to florid downstream disease; six of 8 reconstructive procedures, all of who had multi-segment disease and diabetes, were followed by graft or vessel occlusion leading to major amputations and one death from myocardial infarction. Graft sepsis was a problem and treated with bactericidal antibiotics.

Reconstruction for femoro-popliteal segment athero-sclerotic disease

The femoro-popliteal segment was found to be the site most frequently obstructed (Fig. 6). Angiographic analysis of the run-off at the femoro-popliteal occlusion was possible in 74 patients. The data revealed that in Table 11, 38 patients the high popliteal, supra geniculate segment was patent, the lower, infra-geniculate segment was patent in 19, and that there was no visualisation of a run-off in 17. The result is probably due to timing constraints at angiography in the early years. Thus we had to resort to operative exploration and intra-operative angiographic evaluation of the popliteal artery to determine distal arterial patency. When patency of the popliteal artery was established intra operatively, the patient underwent femoro-popliteal reconstruction with prior consent. In the rest, where distal popliteal artery patency could not be established by intra-operative assessment, the procedure was abandoned and details not recorded. For historical purpose, we report that localized popliteal artery reconstructions were undertaken in a limited number of patients in the early years, which yielded poor results (table 11). In the early part of our work, and in all infra-geniculate procedures, we used reverse saphenous vein grafts to re-establish flow. Synthetic graft (GORE-TEX, Arizona, USA. was used after 1990 in a proportion of patients, who had no evidence of infection, and who required supra-geniculate arterial bypass graft surgery. Post-surgical complications in this group included, vein graft occlusion in 3 patients – two received synthetic grafts and the third underwent below knee amputation. Infective groin lymphadenopathy, common in those with critical ischaemia and lower limb infections, that did not respond to antibiotics, often risked graft infection in the proximal groin anastomosis. This was, to an extent, mitigated by the lateral approach to the femoral artery (8). Other complications encountered were lymphatic leaks and post-surgical myocardial infarction.

Management of tibial arterial disease

In 86 patients, there was isolated tibial disease and these patients mostly presented with critical ischaemia (table 12). As previously mentioned, management in this group of patients centred on non-operative measures and lumbar sympathectomy or amputation.

Discussion

There is no substantial report of surgical reconstruction for atherosclerotic arterial disease of the lower limbs in Sri Lanka. This study is both a report of surgical evolution for ischaemic lower limb arterial surgery over 34 years, and presents previously unknown data in Sri Lankan patients with arterial ischaemia of the lower limbs.

An incidence of critical ischaemia in 57 percent of Sri Lankan patients with atherosclerotic occlusive disease is dramatically different from reports from the United Kingdom (6, 9). There may be an association with florid atherosclerosis that is, in general, reported in the coronary arteries of South Asians (10). In part, this phenomenon has been attributed to the small diameter of coronary arteries in South Asians (10). This begs the question, “Is this phenomenon the lower limb artery equivalent in South Asians?” Another hypothesis is that atherosclerotic arterial disease occurs in vessels previously primed by thrombo-angiitis obliterans, as has been reported in Israel (11). Such high prevalence may also represent late presentation in our patients.

In the early period of our work, thrombo-angiitis obliterans was the dominant disease in Sri Lanka, for which arterial reconstruction was often unsuccessful (3). We observed that the prevalence of atherosclerotic lower limb arterial disease gradually became more dominant over TAO, where in the latter two decades of this study, there was a reduction in the presentation of TAO patients, which made surgical reconstruction more feasible. Corresponding to this change in aetiology, we undertook fewer lumbar sympathectomy and lower limb amputations and more reconstruction procedures for lower limb ischaemia.

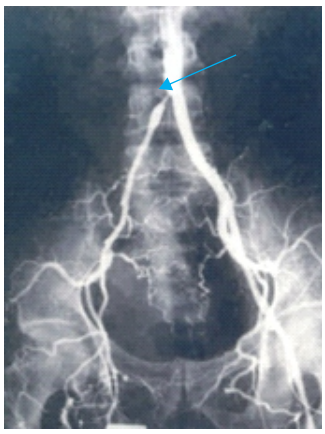

Figure 5. Aorto-iliac angiogram indicating unilateral atherosclerotic disease of the iliac artery (arrow)

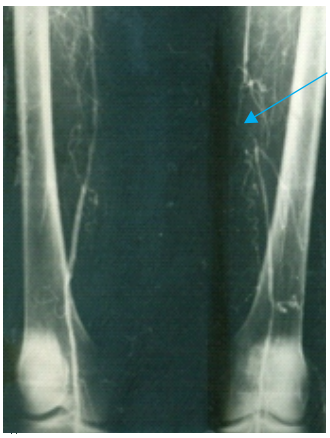

Figure 6. Femoral angiogram showing the most frequent site of occlusion at the femoro-popliteal segment (arrow)

Table 9. Result of reconstruction for symptomatic iliac artery atherosclerosis

Reconstructions for ASO iliac disease							
	Number	TE/VGA	FFGCO	A/I FGBP	ABF	Success	Death
Common iliac	76	37	13	22	4	62	3
External iliac	13	3	4	4	2	7	2

TE/VGA - Thrombo-endarterectomy and vein or graft patch angioplasty;

FFCO - Femoro-femoral cross over graft/vein bypass;

A I/FGB - Aorto/ ilio-femoral graft bypass; **ABF** - Aorto-femoral graft bypass.

Table 10. Outcome of common femoral artery reconstruction for atherosclerosis at its bifurcation (CFB)

Common Femoral Bifurcation (CF B) Atherosclerotic Disease n=8						
	Number	CFTE	CFTEV/GPA	EFCOGBP	Success	Death
CFB	8	2	5	1	2	1

CFTE- Common femoral thrombo-endarterectomy;

CFTE- VGPA common femoral thrombo endarterectomy and vein or graft patch angioplasty; EFCOGBP- Femoro-femoral crossover graft bypass with CFTE.

Table 11. Outcome of common femoral artery reconstruction for atherosclerosis at its bifurcation (CFB)

Femoro- popliteal atherosclerotic Disease n=88								
		Number	Supragen FPV/GBP	Infragen FPV/GBP	F-TBP	TE+/- V/GPA	Success	Death
Femoro-popliteal	Early 1974 - 1989	38	27	6	1	4	25	2
	Late 1990 - 2007	38	11	13	14	0	31	0
Localised popliteal		12				10	3	0
Total		88	38	19	15	14	59	2

FPV/GBP - Fem-popliteal bypass graft using either vein or graft **F-TBP -** Fem-tibial bypass **Infragen -** Infra-geniculate

TE/+/-VP/GPA - Thrombo-endarterectomy and vein/graft patch angioplasty **Supragen** - Supra-geniculate

Table 12. Demography of patients with occlusive tibial and distal artery disease

Demography of Tibial and distal occlusive disease			
Age (years)	<35	35-49	>50
Number	4	23	59
Female	1	4	22
Non-smoker (%)	2	6	14
Diabetes	1	2	22
Ischaemic heart disease	2	4	6
Stroke	1	1	11
C/CI	0/4	5/18	17/42
% CI	100	78	71

C- Claudication only; CI- Critical ischaemia +/- claudication

The aortic occlusions were mostly in male patients, of younger age and in those with hyperlipidaemia, although serum analysis for hyperlipidaemia became routine in the latter years of the study. Somehow, juxta renal aortic occlusive disease seemed to protect the arterial tree downstream from occlusive atherosclerosis, and in this series, 97 percent of patients with aortic disease had only claudication and 87 percent with distal aortic involvement presenting with claudication of the lower limbs. These data are similar to reports from countries with a dominant Caucasian population (8). For reconstruction, this is an advantage, as post-operative graft sepsis is a risk in those who present with critical ischaemia and either associated overt or sub-clinical infection in the lower extremities. By contrast, atherosclerotic disease of the aortic bifurcation and distal arteries seemed to be a presenting feature in mainly older adult patients, who also had a greater percentage of critical ischaemia at presentation. Older patients also tended to have multi-segment disease and a greater prevalence of diabetes compared with their younger counterparts, which reduced the success of outcome of surgical reconstruction. Included in this group were four females probably falling into the "small aortas in small women syndrome (12). Patch aortoplasty was quite successful in this group.

Overall, mortality in our study was 6.6% and was comparable to reports of 7% (5) and 6.3% (9), from other centres. As is established, the commonest site of occlusion of the femoro-popliteal segment of the artery was at the adductor hiatus in this study and in most international data (13). Data of femoro-popliteal reconstruction for limb ischaemia in the '90 s showed that results of femoro-popliteal bypass procedures which did incorporate vascular grafts that crossed the knee were superior to the use of infra-geniculate graft procedures (14). As surgical techniques and imaging modalities have further evolved to enable surgeons undertake distal vascular reconstruction, and yet further, to use minimally invasive techniques in limb re-vascularisation, further reports of results in these areas would be awaited with interest. This study falls short in its longer-term follow up of graft patency and multivariate analysis of surgical outcomes related to age, risk factors for ASO, and gender. In conclusion, this cross-sectional study over 34 years reports a process of surgical evolution for lower limb ischemia in a population where the primary pathology has changed from thrombo-angiitis obliterans to predominantly atherosclerosis that is similar to the West. Athrosclerosis induced stenosis of the distal aorta, which involved the iliac arteries, showed greater prevalence of critical ischaemia at presentation, which indicated multi-segment disease. The latter differs from the West.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Weerasena M. Peripheral Arterial disease in Sri Lanka. Ceylon Medical Journal, 1976; 22: 159-176.
2. Sheriffdeen A, H. Peripheral Arterial Surgery. Ceylon Medical Journal, 1985; 30: 13-27.
3. Ratnatunga C. Hewavithane B.H. Atherosclerotic Occlusive Disease of the Aorta, Clinical Aspects. Sri Lanka Journal of Medicine, 2001; 10: 25-36.
4. Shionoya S, Ban I, Nakata T, Matsubara J, Hirai M, Miyazaki A. Vascular Reconstruction in Buerger's Disease. British Journal Surgery, 1976; 63: 841- 846. https://doi.org/10.1002/bjs.1800631102
5. Minken S L, De Weese J A, Southgate W A, Mahoney E B, Rob C G. Aortoiliac reconstruction in atherosclerotic occlusive disease. Surgery, Gynecology and Obstetrics, 1968; 126: 1056-1060.
6. Irvine W T, Booth R A D, Myers K. Arterial Surgery for aorto-iliac occlusive disease. Early and late results in 238 patients. Lancet, 1972; vol: 738 – 741.
7. Fahal AH, Mc Donald P, Marston A. Femoro-femoral bypass in unilateral iliac occlusion. British Journal of Surgery; 1989; 76: 22-25.https://doi.org/10.1002/bjs.1800760108
8. Sheriffdeen A.H. A new approach to the femoral artery. Ceylon Medical Journal, 1984; 29: 93-96.
9. Taylor G W. and Calo A R. Atherosclerosis of arteries of lower limbs. British Medical Journal, 1962; 1: 507-510. https://doi.org/10.1136/bmj.1.5277.507
10. Ghumman M. Coronary Disease in South Asians. Clinical Correlations -N Y U Langone online journal of Medicine 2009; accessed 18.7.2018.
11. Mozes M, Cahansky G, Doitsch V, Adar V. The association of atherosclerosis and Buerger's disease. A Clinical and Radiological Study. Journal of Cardiovascular Surgery. 1970; 11: 52-59
12. Cronenwett JL, Davies J.T, Gooch JH,Garett L.E. Aorto- iliac disease in women. Surgery 1980; 88: 775-784.
13. Mavor G E. The pathology and the management of chronic ischaemia of the lower limb. Journal of the Royal College of Surgeons Edinburgh 1958; 3:264-285.
14. Veith F J, Gupta S.K., Ascer E, White-Flores S, Samson R.H, Scher L A, et al six year prospective multicentre randomized comparison of autologous saphenous vein and expanded polytetrafluoroethylene grafts in infra inguinal arterial reconstruction. Journal of Vascular Surgery 1986; 3: 104-114. https://doi.org/10.1016/0741-5214(86)90073-X

SCIENTIFIC ARTICLE

Anatomical landmarks to locate the junction between transverse and sigmoid sinuses in translabyrinthine and retrosigmoid open surgical approaches

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Keywords: Transverse sinus; sigmoid sinus; translabyrinthine approach; retrosigmoid approach; cerebellopontine angle

Abstract

Introduction

Hematoma due to dural-sinus damage is a known complication when introducing burr holes in open transcranial surgery. Our objective was to identify safe areas to avoid dural-sinus damage based on anatomical landmarks in translabyrinthine and retrosigmoid open surgical approaches where neuronavigation facilities are not available.

Methods

A descriptive anatomical study was conducted on adult skulls. Distances to transverse and sigmoid sinuses on either side were measured using fixed anatomical landmarks: asterion, inion, margins of suprameatal triangle and superior nuchal line. Measurements were standardized according to the cranial indices (cranial index=anteroposterior diameter/transverse diameter) of each skull.

Results

Thirty-two adult skulls (male:female=22:10) were studied. Mean cranial index, width of transverse and sigmoid sinuses were 0.785 ±0.045, 9.1±2.3mm and 9.7±1.2mm respectively. Mean vertical distances from asterion and inion to the transverse sinus were 1.1±3.4mm and 14.7±5.9mm respectively. Posterior border of the sigmoid sinus was located 14.7±5.9mm, and 59.9±7.4mm anterior to asterion and inion respectively. t-tests did not show significant differences of these distances on either sides ($p>.05$). Pearson's correlations were insignificant between the measurements and the cranial indices ($p>.05$). Measurements from the suprameatal triangle to the dural-sinuses had the minimum variance. In >95% of the times the sigmoid sinus was located ≤23 mm posterior and ≤7 mm superior to the suprameatal triangle.

Discussion and conclusions

Suprameatal triangle was a consistent surface landmark to locate dural-sinuses. Dural-sinus damage could be avoided in 95% of the times by placing burr hole at least 7mm superior and 23 mm posterior to the suprameatal triangle.

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Introduction

Cerebellopontine angle (CPA) approach during neurosurgery is challenging (1). CPA is located posterior to the petrous part of temporal bone, anterior to the frontal part of cerebellum, superior to the arachnoid tissue of lower cranial nerves (1). CPA is a frequent site of neoplasms and vascular anomalies (2). The commonest pathology that requires surgical resection in this area is the CPA tumors, which has an incidence of 4% (2, 3). Acoustic schwannomas are benign tumors accounting for approximately 80% of tumors of the CPA (4). This pathology requires surgical resection as the definitive treatment method (3-5).

The traditional method of CPA tumor removal is open surgery which involves placement of burr holes (6). The main advantage in open surgery is to have a good visualization of the surrounding structures (5). The common surgical methods in making the initial burr hole to reach the pathologies in the CPA are the subtemporal retrosigmoid (7,8) and translabyrinthine approaches(9). Retrosigmoid approach involves cranial opening posterior to the sigmoid sinus preceded by retraction of the cerebellum to reach CPA (7). Translabyrinthine approach includes opening on to the CPA angle with external burr hole made in close proximity to transverse sinus and inner opening next to the sigmoid sinus (9). This method is only done when hearing preservation is not required (8). Transverse and sigmoid sinus junction will be closely related in translabyrinthine approach (9).

During the cranial drilling process and visualization, the surrounding neurovascular structures are prone to get damaged (10). Transverse sinus and sigmoid sinus are susceptible for injury leading to morbidity and mortality in patients during retrosigmoid and translabyrinthine craniotomy (11,12). Neuronavigation is a novel neurosurgical adjunct used in operative management of brain pathologies (13). Localizing intracranial structures can be aided by pre-operative image superimposition using stereotactic neuron-

avigation techniques (14). Although the localization of these dural sinuses can be done using neuronavigation equipment; these advanced techniques are not readily available in all the centers around Sri Lanka. To prevent damage to these dural-sinuses, surface landmarks can be used as a guide to recognize the transverse sigmoid sinus junction (12). Asterion, inion, superior nuchal line and suprameatal triangle were such structures believed to be helpful in locating the transverse sigmoid sinus junction (15, 16). However, during recent years cadaveric research on the location of these was found to be inconstant among individuals (15, 17).

In different populations the skull size and shape vary (18). There were a few studies done in the Western countries to locate the safe area in burr hole placement for CPA surgery (19). However, in Asia we could not find any articles addressing this issue. In this study we focused on finding a safe area of cranial entrance in initial burr hole making for CPA surgery, avoiding damage to the dural venous sinuses.

Method

A descriptive anatomical study was conducted on adult skulls obtained by self-donated cadavers in the Departments of Anatomy and Forensic Medicine, Faculty of Medicine, University of Colombo, Sri Lanka from March to June 2018. Both male and female adult skulls of Sri Lankan nationality were selected randomly. Skulls with deformities, trauma and previous surgeries were excluded from the study.

Definitions

The anatomical landmarks used in the present study were defined as below

- Inion – the most prominent point of external occipital protuberance (6)
- Nasion – the point on cranium where frontonasal and internasal sutures unite (6)
- Asterion- the junction of lambdoid, parieto-mastoid and occipito-mastoid sutures (6)
- Suprameatal triangle – a triangle formed by the posterior border of the external auditory canal, supramastoid crest and the vertical tangent to the posterior wall of the bony external auditory canal (6). The superior margin of the suprameatal triangle was taken as the reference point for all the vertically measured distances and the anterior margin was taken as the reference point for all the horizontally measured distances.
- Cranial index was calculated by dividing the maximum anteroposterior diameter of the skull by its maximum transverse diameter (6).

Measurements

All the measurements were recorded with the skull in the anatomical position in Frankfurt plane (6). The following measurements were obtained using a Vernier caliper [Manufacturer- Mitutoyo (Kanagawa- Japan) (Model No-505-633-50)] and standard measuring tapes (Figure 1).

1. The horizontal distance from asterion to the posterior border of the sigmoid sinus
2. The vertical distance from asterion to the inferior border of the transverse sinus
3. The horizontal distance from the posterior border of suprameatal triangle to the anterior border of the sigmoid sinus
4. The vertical distance from the superior border of suprameatal triangle to the inferior border of the transverse sinus
5. The horizontal distance from the midpoint of nasion and inion to the posterior border of the sigmoid sinus

All the horizontal measurements towards the anterior aspect of the skull were considered positive and towards the posterior aspect were considered negative. All the vertical measurement towards the superior aspect of the skull was considered positive and towards the inferior aspect was considered negative. If any anatomical landmark used overlied the corresponding sinus, the distance was considered as zero.

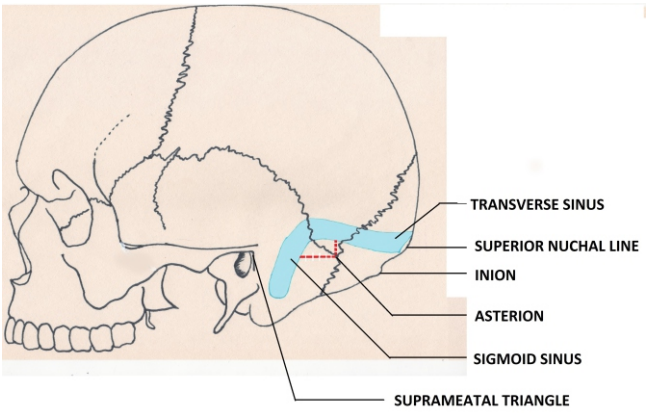

Figure 1. Diagrammatic representation of the anatomical landmarks used to locate the transverse and sigmoid sinuses. All the measurements were obtained with the skull positioned in Frankfurt plane. The horizontal and vertical distances measured from the asterion to the posterior border of the sigmoid sinus and the inferior border of the transverse sinus are marked in an interrupted line.

Statistical Analysis

Standard descriptive analyses were conducted with a priori alpha of .05. Measurements were standardized according to the cranial indices of each skull. A safe zone was described for the transcranial burr hole placement using the measurements which had the least variation.

Results

Thirty-two adult skulls were studied. Of them, majority (n=22, 68.7%) were male skulls. Mean cranial index was 0.785±0.045. Mean width of transverse and sigmoid sinuses were 9.1±2.3mm and 9.7±1.2mm respectively. Mean vertical distances from asterion and inion to the transverse sinus were 1.1±3.4mm and 14.7±5.9mm respectively. Posterior border of the sigmoid sinus was located 14.7±5.9mm, and 59.9±7.4mm anterior to asterion and inion respectively. The asterion (right side) was located on the transverse sinus in 10 (31%) skulls, inferior to the transverse sinus in 6 (19%) skulls and superior to the transverse sinus in 16 (50%) skulls. A summary of the measurements from standard anatomical landmarks to the respective sinuses are given in the Table 1. The distances were examined to determine the extent to which the assumption of normality was met. Shapiro-Wilk tests for each measurement ($p>.05$) suggested that normality is a reasonable assumption. Independent sample t-tests were conduct to see if there is a significant difference of the above mentioned measurements on left and right sides of the skull. The results showed no significant differences of these distances on either sides ($p>.05$) (Table 1). Thus, measurements of left and right sides were pooled together in subsequent analyses. Independent sample t-tests did not show significant differences of any of these measurements between males and females ($p>.05$). Relationship between the cranial indices and the measurements were investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violations of the assumptions of linearity and homoscedasticity. No significant correlations were found between the two variables ($p>.05$). Results of the Pearson correlations are summarized in the Table 1. Interquartile ranges of each measurement are summarized in a boxplot in Figure 2. Minimum variances were noted in the measurements from the suprameatal triangle to transverse sinus (8.6), asterion to transverse sinus (11.8) and suprameatal triangle to sigmoid sinus (13.8). In >95% of the times the sigmoid sinus was located ≤70.0mm anterior to the inion, ≤25 mm anterior to the asterion and ≤23 mm posterior to the posterior border of the suprameatal triangle. The transverse sinus was located ≤16 mm inferior to the superior nuchal line, ≤9 mm superior to the asterion and ≤7 mm superior to the superior margin of the suprameatal triangle (supramastoid crest).

Table 1. A summary of measurements to the transverse and sigmoid sinuses from fixed anatomical landmarks and the results of an independent sample t-test comparing the distances on left and right sides of the skulls (For a detailed description of measurements, please refer to the relevant section in methods). SD – Standard Deviation; Sig – Significance level; SS – Sigmoid Sinus; t- result (t-value) of the independent sample t-test; TS – Transverse Sinus.

Measurement	Mean (mm)			SD (mm)			Range (mm)		No. of measurements superimposed on a sinus		Results of t-test		Results of Pearson Bivariate Pearson's correlations	
	R	L	B/L	R	L	B/L	R	L	R	L	t Value	Signifi cance	Pearson correlation coefficient (r)	Signific ance
Asterion to TS	1.3	0.8	1.1	2.8	4.0	3.4	-4.0 to +11.0	-7.0 to +11.0	10	10	0.543	0.589	-0.129	0.309
Asterion to SS	14.9	14.5	14.7	6.5	5.5	6.0	+1.0 to +30.0	+3.0 to +25.0	0	0	0.251	0.803	0.075	0.555
Superior nuchal line to TS	2.4	2.2	2.3	6.4	7.0	6.6	-15.0 to +18.0	-19.0 to +18.0	6	7	0.131	0.896	0.005	0.971
Inion to SS	59.7	60.0	60.0	7.9	7.0	7.4	+45.0 to +85.0	+41.0 to +73.0	0	0	-0.168	0.867	0.080	0.530
Suprameatal triangle to TS	1.9	1.0	1.5	2.9	3.0	2.9	-3.0 to +9.0	-5.0 to +7.0	17	9	1.195	0.237	0.004	0.975
Suprameatal triangle to SS	-18.0	-18.3	-18.2	3.7	3.8	3.7	-10.0 to -261.0	-9.0 to -23.0	0	0	-0.334	0.739	0.064	0.615
Width of TS	9.2	9.0	9.1	2.2	2.5	2.3	+4.0 to +15.0	+5.0 to +15.0	0	0	0.265	0.792	0.101	0.429
Width of SS	9.9	9.6	9.7	1.3	1.1	1.2	+7.0 to +12.0	+7.0 to +12.0	0	0	0.908	0.368	-0.080	0.529

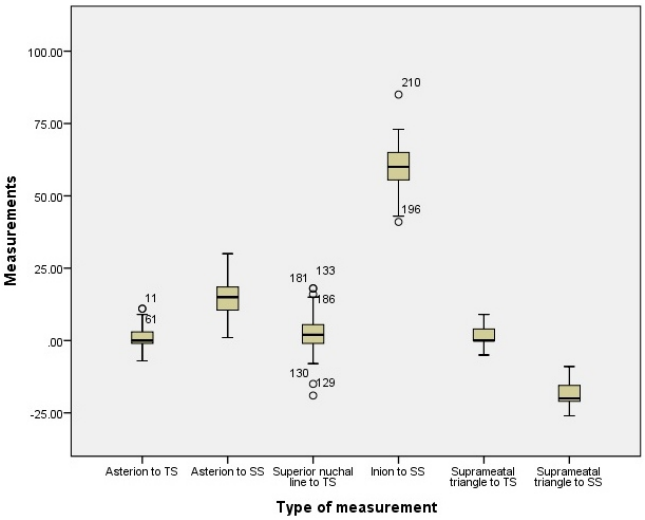

Figure 2. A boxplot of corresponding vertical and horizontal distances from the anatomical landmarks to the transverse and sigmoid sinuses. All the horizontal measurements towards the anterior aspect of the skull were considered positive and towards the posterior aspect were considered negative. All the vertical measurement towards the superior aspect of the skull was considered positive and towards the inferior aspect was considered negative. If any anatomical landmark used overlies the corresponding sinus, the distance was considered as zero. Measurements are given in millimeters.

Discussion

Anatomical structures asterion, inion, superior nuchal line and suprameatal triangle were used as landmarks to locate the junction between transverse and sigmoid sinuses (15, 16). However, further studies revealed that there were inconsistencies with the transverse and sigmoid junction and the location of these anatomical structures (15, 17). Also, asterion was difficult to locate intra-operatively (19). Retrosigmoid and translabyrinthine approaches are main methods used to gain access in the CPA tumor resection (7, 8). They were first described by Cushing, followed by further adjustments and alterations by Seiffert and Dandy among others, in order to gain entrance to the CPA (20). During this procedure with no advanced neuronavigation techniques available, the transverse and sigmoid sinus damage can cause minor injuries to major life threatening ones (11). Thus, when gaining entrance to the cranial cavity it is mandatory to have an idea of the location of tranverse and sigmoid dural venous sinuses.

A study done on 100 patients undergoing computed tomography angiography showed that the asterion was directly above the transverse and sigmoid sinus junction in 81%, superior to it in 4% and inferior to the junction in 15% (20). Another cadaveric study on 24 specimens indicated the asterion to be located over the transverse sinus in all the specimens (21). But in the same study, the asterion could not be identified clearly in 14 sides (21). The mean vertical distance from asterion to the transverse sinus was 1.1±3.4mm in our study. Asterion was located on the right transverse sinus in 31%, inferior to the transverse sinus in 26% and superior to the transverse sinus in 42%. Distance from inion to the dural-sinuses was not described in any of the former studies. However, length from an arbitrary midline structure was used in one study to measure the length to asterion (21). Ucerler and Govsa reported; asterion to the root of zygoma was 54.1± 5.42mm on the right side and 55±5.4mm on the left side (22). Avci, et al. stated the distance from the asterion to the zygomatic root in the cadavers ranged between 45.9 mm to 69 mm (21). In our study the sigmoid sinus was located 14.7±5.9 mm and 59.9±7.4 mm anterior to asterion and inion respectively. Sheng, et al. concluded that superior nuchal line failed to make a striking impression in locating the transverse sinus (23). The findings of our study are comparable with this.

The suprameatal triangle was used as a landmark to locate the junction between transverse and sigmoid sinuses (24). Nevertheless, there were no anatomical studies indicating any distance from suprameatal triangle to the transverse or sigmoid sinus. In our study, the transverse sinus was situated superiorly at a mean vertical distance of 1.5±2.9mm and the sigmoid sinus was located posteriorly at a mean horizontal distance of 18.2±3.7mm with reference to the corresponding margins of the suprameatal triangle. The location of the dural venous sinuses with reference to the suprameatal triangle had the minimum variance. Thus, it is a promising anatomical landmark which can be used in the retrosigmoid approach to the CPA.

Only a few studies were conducted in localizing the safe area for surgical access. Tubbs et al. established that the cranial entrance should be in made 9.1mm and 9.8mm from the mastoid line (19). Right side burr hole to be made inferior to the left, because of the width and dominance of right transverse sinus (19). Bozbuga, et al. after doing a study on 84 adult skulls said the ideal burr hole placement is below the superior nuchal line and posterior to the mastoid tip and squamo-parietal suture junction (7). Nevertheless, the distances to the safe cranial entrance was not defined in both of these studies. Avici, et al. mentioned that the superior burr hole to be placed 1cm below the superior nuchal line 1cm medial to the mastoid groove (21). However, the conclusion was based after studying only 10 skulls.

Anatomical land marks to transverse and sigmoid sinuses were not measured in an Asian population before. Large scale studies are necessary for the accurate population inferences. The differences of the measurements in our study could be due to morphological variations of the skulls in sample populations. Thus, it is necessary to conduct similar anatomical studies in different ethnicities and populations.

Conclusion

We observed discrepancies of the described anatomical landmarks related to the burr hole placement in CPA tumor resection that avoids damage to the transverse and sigmoid sinuses. Since the advanced neuronavigation equipments are not readily available throughout the country, it is beneficial to have an idea of such landmarks in dural sinus location. Suprameatal triangle was a consistent surface landmark with a minimum variance. Dural sinus damage could be avoided in 95% of the times by making the initial burr hole at least 7mm superior to the superior margin of the suprameatal triangle (supramastoid crest) and 23 mm posterior to the posterior margin of the suprameatal triangle. However, large scale studies in different ethnicities with clinical and imaging correlations are necessary to confirm these anatomical landmarks.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Chaynes P, Deguine O, Moscovici J, Fraysse B, Bécue J, Lazorthes Y. Endoscopic anatomy of the cerebellopontine angle: a study in cadaver brains. Neurosurgical focus. 1998;5(3):E13. https://doi.org/10.3171/foc.1998.5.3.14
2. Mirza S, Malik T, Ahmed A, Willatt D, Hughes D. Incidental findings on magnetic resonance imaging screening for cerebellopontine angle tumours. The Journal of Laryngology & Otology. 2000;114(10):750-4. https://doi.org/10.1258/0022215001904077
3. Van Rompaey J, Bush C, McKinnon B, Solares AC. Minimally invasive access to the posterior cranial fossa: an anatomical study comparing a retrosigmoidal endoscopic approach to a microscopic approach. Journal of Neurological Surgery Part A: Central European Neurosurgery. 2013;74(01):001-6. https://doi.org/10.1055/s-0032-1330119
4. Anderson TD, Loevner LA, Bigelow DC, Mirza N. Prevalence of unsuspected acoustic neuroma found by magnetic resonance imaging. Otolaryngology—Head and Neck Surgery. 2000;122(5):643-6. https://doi.org/10.1016/S0194-5998(00)70189-6
5. Memari F, Hassannia F, Abtahi SHR. Surgical outcomes of cerebellopontine angle tumors in 50 cases. Iranian journal of otorhinolaryngology. 2015;27(78):29.
6. Keith L. Moore AFD, Anne M.R. Agur. Moore Clinically oriented anatomy. 7 ed: Woters Kluwer; 2014. 828-30 p.
7. Bozbuga M, Boran BO, Sahinoglu K. Surface anatomy of the posterolateral cranium regarding the localization of the initial burr–hole for a retrosigmoid approach. Neurosurgical review. 2006;29(1):61-3. https://doi.org/10.1007/s10143-005-0417-2
8. Elhammady MS, Telischi FF, Morcos JJ. Retrosigmoid Approach:: Indications, Techniques, and Results. Otolaryngologic Clinics of North America. 2012;45(2):375-97. https://doi.org/10.1016/j.otc.2012.02.001
9. Arriaga MA, Lin J. Translabyrinthine Approach:: Indications, Techniques, and Results. Otolaryngologic Clinics of North America. 2012;45(2):399-415. https://doi.org/10.1016/j.otc.2011.12.009
10. Cappabianca P CM, Esposito F, de Divitiis E, Tschabitscher M. Endoscopic examination of the cerebellar pontine ange. Clinica neurology and neurosurgery. 2002 Sep 1;104(4):387-91. https://doi.org/10.1016/S0303-8467(02)00022-7
11. Oh GS, Arnone GD, Abou-Al-Shaar H, Barks AL, Wong A, Charbel FT. Surgical Repair of Iatrogenic Transverse-Sigmoid Sinus Laceration with a Dural Flap During Skull Base Tumor Surgery: A Technical Case Report. World neurosurgery. 2017;106:1050. e7-. e10.
12. da Silva EB, Leal AG, Milano JB, da Silva LFM, Clemente RS, Ramina R. Image-guided surgical planning using anatomical landmarks in the retrosigmoid approach. Acta neurochirurgica. 2010;152(5):905-10. https://doi.org/10.1007/s00701-009-0553-5
13. Orringer DA, Golby A, Jolesz F. Neuronavigation in the surgical management of brain tumors: current and future trends. Expert review of medical devices. 2012;9(5):491-500. https://doi.org/10.1586/erd.12.42
14. Cheon J-E. Intraoperative neurosonography revisited: effective neuronavigation in pediatric neurosurgery. Ultrasonography. 2015;34(2):79. https://doi.org/10.14366/usg.14054
15. Gharabaghi A, Rosahl S, Feigl G, Samii A, Liebig T, Heckl S, et al. Surgical planning for retrosigmoid craniotomies improved by 3D computed tomography venography. European Journal of Surgical Oncology. 2008;34(2):227-31. https://doi.org/10.1016/j.ejso.2007.01.032
16. Chanda A, Nanda A. Retrosigmoid intradural suprameatal approach: advantages and disadvantages from an anatomical perspective. Operative Neurosurgery. 2006;59(suppl_1):ONS-1-ONS-6.
17. Wang C, HAN G, You C, Liu C. Clinical Application of Scalp Markers and Three-Dimensional Sliced Computed Tomography Reconstructions of the Skull Transverse-Sigmoid Sinus Groove in the Retrosigmoid Approach. Turk Neurosurg. 2017:1.
18. Looker AC, Melton LJ, Harris T, Borrud L, Shepherd J, McGowan J. Age, gender, and race/ethnic differences in total body and subregional bone density. Osteoporosis international. 2009;20(7):1141-9. https://doi.org/10.1007/s00198-008-0809-6
19. Tubbs RS, Loukas M, Shoja MM, Bellew MP, Cohen-Gadol AA. Surface landmarks for the junction between the transverse and sigmoid sinuses: application of the "strategic" burr hole for suboccipital craniotomy. Operative Neurosurgery. 2009;65(suppl_6):ons37-ons41.
20. Tatagiba M, Acioly MA. Retrosigmoid approach to the posterior and middle fossa. Samii's Essentials in Neurosurgery: Springer; 2014. p. 217-35.
21. Avci E, Kocaogullar Y, Fossett D, Caputy A. Lateral posterior fossa venous sinus relationships to surface landmarks. Surgical neurology. 2003;59(5):392-7. https://doi.org/10.1016/S0090-3019(03)00037-5
22. Ucerler H, Govsa F. Asterion as a surgical landmark for lateral cranial base approaches. Journal of cranio-maxillo-facial surgery. 2006;34(7):415-20. https://doi.org/10.1016/j.jcms.2006.05.003
23. Sheng B, Lv F, Xiao Z, Ouyang Y, Lv F, Deng J, et al. Anatomical relationship between cranial surface landmarks and venous sinus in posterior cranial fossa using CT angiography. Surgical and radiologic anatomy. 2012;34(8):701-8. https://doi.org/10.1007/s00276-011-0916-5
24. Ebner F, Koerbel A, Kirschniak A, Roser F, Kaminsky J, Tatagiba M. Endoscope-assisted retrosigmoid intradural suprameatal approach to the middle fossa: anatomical and surgical considerations. European journal of surgical oncology. 2007;33(1):109-13. https://doi.org/10.1016/j.ejso.2006.09.036

SCIENTIFIC ARTICLE

Value of upper gastrointestinal endoscopy in evaluating patients presenting with dyspepsia

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Key words: Upper gastrointestinal endoscopy; upper abdominal pain; dyspepsia

Abstract

Introduction

Dyspepsia is a common symptom that is encountered in clinical practice and upper gastrointestinal endoscopy (UGIE) has gained wide acceptance in the evaluation of dyspepsia. This study was aimed to determine the yield of UGIE in patients presenting with dyspepsia to a tertiary care centre.

Methods

A retrospective analysis of patients followed up at a single unit in a tertiary care hospital from 2007 to 2016 was carried out. Patients who underwent UGIE for evaluation of dyspepsia were included in the study. Those with additional symptoms like dysphagia, loss of weight, loss of appetite and pancreato-biliary pathology were not included. The yield of UGIE in patients with dyspepsia (i.e. peptic ulcer, gastritis, polyp, cancer) in relation to two age groups (≤40 years and >40 years) was determined and compared.

Results

A total of 491 patients were analysed (males = 259, 52.7%; mean age = 46 65 ± SD21.93 years). Among them, 31.97 % (n=157) were aged 40 years or less. Abnormalities were detected in 301(61.3%) patients (peptic ulcer - 2.44%, gastritis - 20.4%, polyp-3.9%, endoscopically malignant lesions - 3.2%). In the ≤40 age group, 58.6% (n=93) had positive endoscopic findings (i.e. peptic ulcer -1.2%, gastritis -25.5%, polyp -1.2%, endoscopically malignant lesions-1.9%) while in the >40 year group, 62.6% had positive endoscopic findings (i.e. peptic ulcer -3.0%, gastritis -18.8%, polyp - 5.1%, endoscopically malignant lesions - 4.0%). Only two endoscopically malignant lesions were histologically malignant and both were detected in those who were aged more than 40 years.

Conclusions

In this study, the diagnostic yield of UGIE in detecting peptic ulcers, inflammatory and neoplastic lesions were considerably high in both age groups. Therefore, the age threshold for endoscopy may be lowered to avoid missing a significant lesion.

Background

One-third of adults experience pain or discomfort in the upper abdomen during a given year, of which, one-quarter of them seek medical treatment (1, 2). Nearly 4% of them visit primary care centers with a presenting complaint of dyspepsia, while another 20% visit outpatient gastroenterology consultations (1, 2). However, organic causes are found only in a minority of such patients (3). Research done at the Royal Victoria Hospital, Belfast has shown that 97% of patients over 65 years of age who complained of epigastric pain had abnormal UGIE findings (4).

Another study has revealed that offering UGIE to male patients >45years would be more beneficial because more sinister causes like malignancies are common in males of that age group (5). Routine UGIE in all patients with upper abdominal pain or dyspepsia may impose a considerable burden on the cost of health care, especially in a developing country like Sri Lanka. Therefore, offering UGIE in all patient with clinical symptoms may not be cost effective. Furthermore, routine UGIE in all patients with dyspepsia may result in exposing patients to unnecessary discomfort or complications related to the procedure.

We planned out our study considering the fact that only few studies have been done in the South Asian region regarding this context (6). Therefore, this study was aimed to describe the diagnostic yield of upper gastrointestinal endoscopy in patients presenting with dyspepsia. In addition, we compared the findings between young (40 years or less) and older patients (above 40 years).

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Methods

This was a retrospective analysis of patients who underwent UGIE for evaluation of dyspepsia at the University Surgical Unit of the National Hospital of Sri Lanka (NHSL), which were prospectively recorded from January 2007 to January 2016 using an electronic database which had a standard format.

The study protocol was approved by the Ethics Committee of the National Hospital of Sri Lanka. We defined dyspepsia according to the American Gastroenterological Association technical review definition which states, "chronic or recurrent pain or discomfort centered in the upper abdomen" as dyspepsia (2). The American Gastroenterological Association further states that, patients with predominant frequent heartburn or acid regurgitation are considered to have gastroesophageal reflux disease (GORD) until proven otherwise and are not part of the definition of dyspepsia.

In our unit, patients aged over 40 years presenting with dyspepsia irrespective of the presence of alarming symptoms received UGIE for assessment and patients below 40 years without alarming symptoms were given a trial of proton pump inhibitors before offering UGIE. Details related to the procedure such as, the extent of the anatomy of gastrointestinal tract visualised, abnormalities noted and general patient details such as patient symptoms and duration of symptoms were retrieved from the customized computer based database. Relevant histology reports were also analysed. All adult patients presenting with dyspepsia who underwent UGIE were considered for analysis. Those who had other additional symptoms like dysphagia, loss of weight, loss of appetite and known pancreaticobiliary pathologies were not included. Those who had a previous diagnosis of malignant lesions, polyps, peptic ulcer disease and family history of gastrointestinal malignancies were excluded. Finally a total of 491 patients were included in this study.

All patients underwent UGIE which were performed by general surgeons or by surgical trainees under supervision. All patients were kept fasting 6 hours for solids and 2 hours for liquids before the procedure. A standard 100 cm fibre optic flexible upper gastrointestinal endoscope (Olympus GIF-100; Olympus Optical Co., Ltd., Tokyo, Japan) was used in all cases. Following each procedure, findings were prospectively recorded in an electronic database.

The results of categorical variables were expressed as frequencies and proportions while continuous variables were expressed using means ± standard deviations. The patients were grouped into two categories, i.e. age 40 years or less and age more than 40 years and the yield of UGIE was compared between the two groups.

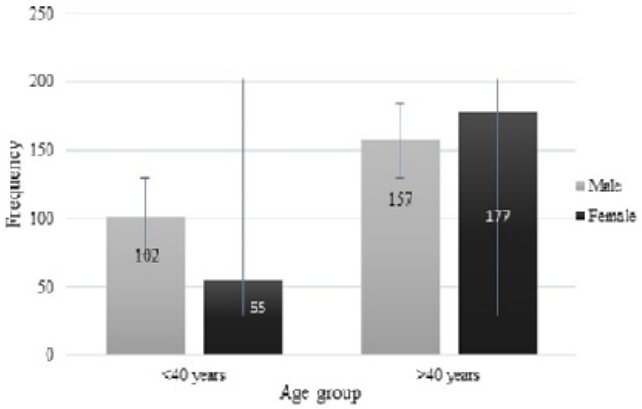

Figure 1. Gender distribution according to the age groups

Results

Demographics

A total of 491 patients were assessed from January 2007 to January 2016. There were 259(52.7%) males and 232(47.3%) females in the study sample. Mean age was 46.65 years (SD±21.93, range 19 -90) years. Of those, 157 (32%) patients were aged 40 years or less and 334 (68%) were aged more than 40 years (Figure 1).

Endoscopic findings

UGIE was unremarkable in 190 (38.7%) patients. Among those with positive findings (n=301), 209 (69.4%) were in the category of age more than 40 years. Gastritis was the commonest endoscopic finding encountered (20.4%, n=101). In addition, there were 19 (3.9%) patients with upper GI polyps, 16 (3.2%) patients with endoscopically malignant lesions, 58 (11.8%) hiatus hernias, 37 (7.5%) erosions and 12(2.44%) peptic ulcer disease. Fungating and/or irregular mass, ulcerated mass or infiltrative and/or irregular ulceration were defined as endoscopically malignant (7).

Among those aged less than 40 years, 58.6%(n=92) had positive findings (i.e.peptic ulcer-1.2%, gastritis-25.5%, polyp-1.2%, endoscopically malignant lesions-1.9%) while in the >40 year group, 62.6% had positive findings (i.e.peptic ulcer-3.0%, gastritis-18.8%, polyp-5.1%, endoscopically malignant lesions-4.0%). Other benign conditions such as oesophagitis and hiatus hernia were comparable in both age groups (Table 1).

A total of 16 (3.2%) patients had endoscopically malignant looking lesions. Of those who were aged 40 years or less, in 3(1.9%) patients, endoscopically malignant lesions were detected. Of those who were aged more than 40 years, 13(3.6 %) endoscopically malignant lesions were identified (Table 1).

Histology findings

Biopsies were taken from 68 patients for histological evaluation. Histology findings were unremarkable in 13 (19.12 %) patients. While 55 (80.88 %) patients had a significant finding. Among them, 9 (16.36%) were aged 40

Table 1. Yield of UGIE in relation to age and sex

UGIE findings	40 years or less (n=157)			More than 40 years(n=334)		
	Males	Female	Total N (%)	Male	Female	Total N (%)
Normal	43	21	65 (41.4%)	56	69	125 (37.4%)
Oesophagitis	3	3	6 (3.8%)	11	7	18 (5.4%)
Hiatus hernia	13	8	21 (13.3%)	14	23	37(11.1%)
Gastritis	24	16	40(25.5 %)	24	39	61 (18.8 %)
Peptic Ulcer	1	1	2 (1.2%)	5	5	10 (3.0%)
Polyp	1	1	2 (1.2%)	12	5	17 (5.1%)
Endoscopically malignant lesions	3	0	3 (1.9%)	6	7	13 (4.0%)
Erosions	7	2	9 (5.7%)	14	14	28 (8.4%)
Bile reflux	1	1	2 (1.2%)	1	0	1 (0.3%)
Gastro-oesophageal candidiasis	0	0	0 (0%)	4	1	5 (1.5%)

Table 2. Histology findings in relation to age and sex

Histology finding	40 years or less			More than 40 years		
	Male	Female	Total	Male	Female	Total
Unremarkable	5	1	6 (40%)	5	2	7 (13.47%)
Chronic gastritis	6	2	8 (53.3%)	14	16	30 (57.69%)
Inflammatory Ulcer	-	-	-	1	2	3 (5.77%)
Reflux oesophagitis	-	-	-	-	3	3 (5.77%)
Reactive gastropathy	-	-	-	3	1	4 (7.69 %)
Hyperplastic polyp	1	-	1 (6.7%)	-	-	-
Duodenitis with reactive atypia of glandular epithilium	-	-	-	1	-	1 (1.92%)
Chronic gastritis with intestinal metaplasia	-	-	-	-	1	1 (1.92%)
Diffuse type adenocarcinoma of stomach (poorly differentiated)	-	-	-	1	-	1 (1.92%)
Squamous cell carcinoma of oesophagus and proximal stomach (moderately differentiated)	-	-	-	-	1	1 (1.92%)
Focal partial villous atrophy	-	-	-	1	-	1(1.92%)
Prominent sub-mucosal Brunner's gland	-	-	-	1	-	1(1.92%)

years or less while 46(83.64%) were more than 40 years. Of those with endoscopic evidence of gastritis, the majority had mild gastritis and therefore, were not subjected to histological evaluation. Chronic gastritis was the commonest histology finding encountered (n=38, 55.9%) in both age groups (Sydney criteria were used to assess gastritis). Further-more, since the gastric polyps detected were small and endoscopically benign, the majority were not routinely sent for histological analysis. Of the four gastric polyps sent for histology, two showed normal mucosa, one showed evidence of chronic gastritis and one was a hyperplastic polyp. (Table 2).

Only two endoscopically malignant lesions were histologically malignant and both were detected in those who were aged more than 40 years (table 2). One was a poorly differentiated adenocarcinoma of the stomach and the other was a moderately differentiated squamous cell carcinoma of the oesophagus and the proximal stomach.

Discussion

Dyspepsia is a common condition which is reported to occur approximately in 25% of the population each year and the American Gastroenterological Association technical review defines dyspepsia as, "chronic or recurrent pain or discomfort centered in the upper abdomen" as dyspepsia (2). Pain in the upper abdomen has been reported to be a predominant symptom, followed by other upper gastrointestinal symptoms.

The initial assessment of patients with dyspepsia include a thorough history and physical examination with prompt attention given to the findings suggestive of sinister causes. However, symptoms can be vague and patients have varying threshold for pain. Furthermore, possible causes may often overlap, resulting in a difficult clinical diagnosis and in most of the patients a definite cause is difficult to establish (6). However, UGIE is helpful in excluding sinister causes such as malignancies and significant causes such as peptic ulcer disease, but the cost effectiveness of routine use of UGIE in a low resource setting like in Sri Lanka is questionable.

Previous studies have shown that in general, a specific aetiology is not identified in about 50 – 60% of patients, and was called functional dyspepsia (). However, variable yield has also been reported (11). In our study, UGIE was normal in 38.7% of patients. The commonest UGIE finding was inflammatory lesions (i.e.gastritis) (19.6%) followed by hiatus hernia (11.8%) and erosions (7.5%). The reason for the difference in the yield may be due to the differences in selection of patients in various studies. In the present study, those patients who had a definite past history suggestive of upper gastrointestinal disease such as diagnosed peptic ulcer disease, history of upper gastrointestinal bleed or melaena, intake of non-steroidal anti-inflammatory drugs (NSAIDS), gall bladder disease and family history of malignancies were not included.

A similar study from South Asia was carried out by MohdMubarik et al (11) to establish the yield of UGIE in 200 patients with dyspepsia. In that study, no abnormality was found in 108 (54%) patients and organic dyspepsia was seen in 92 (46%) patients. In the organic dyspepsia group, the majority (43.47%) had peptic ulcer disease (combined duodenal and gastric), followed by inflammatory lesions (39.13%) which was considerably a higher proportion compared to our study. In a similar study by Mansi et al (12), erosive pre-pyloric changes 16.9% and duodenitis 20.1% were the commonest findings in those who were aged less than 40 years. Furthermore, no malignant lesions were detected in patients aged less than 40 years, while only about 1 % of those aged less than 60 years had neoplasms (12). In a study conducted by Samaila et al (13) in 144 patients, erosive pre-pyloric changes (16.9%) and duodenitis (20.1%) were the commonest findings in those who were aged less than 40 years. Furthermore, no malignant lesions were detected in patients aged less than 40 years, while only about 1% of those aged less than 60 years had neoplasms (13). In a study conducted by Samaila et al on 144 patients, significant findings were detected in about 30.6% of participants which included gastritis and peptic ulcer disease. There was no significant difference in age and gender in relation to the organic pathologies detected (13). The findings in the above mentioned studies varied considerably. Therefore, we suggest that the criteria for endoscopy to be decided based on the disease pattern in the community.

Another recent systematic review with meta-analysis conducted by Chen et al (14) found that, the detection rates of malignancies are high in Asian young population with dyspepsia. Therefore, they suggested age threshold for endoscopy screening in Asian populations to be 35 years. A randomized clinical trial conducted by Tan et al (15) concluded that, treatment with 2 weeks of rifaximin led to adequate relief of global dyspeptic symptoms, belching and post-prandial fullness/bloating in subjects with functional dyspepsia and this difference was more marked in females (15).

It is important to note that in our study, gastritis and hiatus hernia were detected at a higher rate among those aged less than 40 years which can account for their dyspeptic symptoms. However, malignant lesions were detected only in those who were aged more than 40. One limitation of our study is, being retrospective, it may be subjected to observation bias. Furthermore, the clinical significance of certain lesions such as gastric polyps, mild gastritis and hiatus hernia could not be determined due to its retrospective nature. Gastritis was diagnosed endoscopically using white light

endoscopy which is not reliable and therefore may affect the statistical evaluations in this study. Of the suspected endoscopically malignant lesions only 2 were histologically proven. We did not analyse the false negative rates of the histological findings in terms of detecting malignant lesions and therefore, the accuracy of endoscopic diagnosis could not be described. Furthermore, H. pylori which is an important cause of dyspepsia was not analysed in this study. Large scale prospective studies are needed to obtain more accurate findings while overcoming the above limitations.

Conclusion

In our study, the prevalence of peptic ulcer, inflammatory and neoplastic lesions were considerable high in both age groups. Therefore, we suggest a lower threshold for doing UGIE in patients with dyspepsia to rule out any underlying organic cause so that appropriate treatment can be initiated without delay.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Majumdar SR, Soumerai SB, Farraye FA, Lee M, Kemp JA, Henning JM, et al. Chronic acid-related disorders are common and underinvestigated. The American journal of gastroenterology. 2003;98(11):2409-14.
   https://doi.org/10.1111/j.1572-0241.2003.07706.x
2. Talley NJ, Vakil NB, Moayyedi P. American gastroenterological association tech-nical review on the evaluation of dyspepsia. Gastroenterology. 2005;129(5):1756-80.
   https://doi.org/10.1053/j.gastro.2005.09.020
3. Miwa H, Ghoshal UC, Fock KM, Gonlachanvit S, Gwee KA, Ang TL, et al. Asian consensus report on functional dyspepsia. Journal of gastroenterology and hepatology. 2012;27(4):626-41.
   https://doi.org/10.1111/j.1440-1746.2011.07037.x
4. Brown D, Collins J, Love A. Outcome and benefits of upper gastrointestinal endos-copy in the elderly. The Ulster medical journal. 1989;58(2):177.
5. Marmo R, Rotondano G, Piscopo R, Bianco MA, Russo P, Capobianco P, et al. Combination of age and sex improves the ability to predict upper gastrointestinal malig-nancy in patients with uncomplicated dyspepsia: a prospective multicentre database study. The American journal of gastroenterology. 2005;100(4):784-91.
   https://doi.org/10.1111/j.1572-0241.2005.40085.x
6. Bazaldua O, Schneider F. Evaluation and management of dyspepsia. American family physician. 1999;60(6):1773-84, 87-8.
7. Wu W, Wu Y-L, Zhu Y-B, Wei Q, Guo Y, Zhu Z-G, et al. Endoscopic features predictive of gastric cancer in superficial lesions with biopsy-proven high grade intraepi-thelial neoplasia. World Journal of Gastroenterology : WJG. 2009;15(4):489-95.
   https://doi.org/10.3748/wjg.15.489
8. Brun R, Kuo B. Functional dyspepsia. Therapeutic advances in gastroenterology. 2010;3(3):145-64.
   https://doi.org/10.1177/1756283X10362639
9. Talley NJ, Silverstein MD, Agreus L, Nyren O, Sonnenberg A, Holtmann G. AGA technical review: evaluation of dyspepsia. Gastroenterology. 1998;114(3):582-95.
   https://doi.org/10.1016/S0016-5085(98)70542-6
10. Richter J. Dyspepsia: organic causes and differential characteristics from func-tional dyspepsia. Scand J Gastroenterol. 1991;26(sup182):11-6.
11. MohdMubarik M, Malik G. diagnostic yield of upper GI endoscopy and ultraso-nography in patients of dyspepsia. JK-Practitioner. 2012;17(4):15-9.
12. Mansi C, Mela GS, Savarino V, Mele MR, Valle F, Celle G. Open access endosco-py: a large-scale analysis of its use in dyspeptic patients. J Clin Gastroenterol. 1993;16(2):149-54.
   https://doi.org/10.1097/00004836-199303000-00015
13. Samaila A, Okeke E, Malu A. Endoscopic findings and clinical predictors of organ-ic disease among patients with dyspepsia in Jos, Nigeria. Nigerian Journal of Gastroenter-ology and Hepatology. 2011;3(1-2):39-46.
14. Chen S, Gwee K, Lee J, Miwa H, Suzuki H, Guo P, et al. Systematic review with meta‐analysis: prompt endoscopy as the initial management strategy for uninvestigated dyspepsia in Asia. Alimentary pharmacology & therapeutics. 2015;41(3):239-52.
   https://doi.org/10.1111/apt.13028
15. Tan V, Liu K, Lam F, Hung I, Yuen M, Leung W. Randomised clinical trial: rifax-imin versus placebo for the treatment of functional dyspepsia. Alimentary pharmacology & therapeutics. 2017;45(6):767-76.
   https://doi.org/10.1111/apt.13945

REVIEW ARTICLE

Basics in molecular evolution of colorectal cancer and their implications for the surgeon: is it a 'big-bang' or a 'survival of the toughest'?

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Key words: Colorectal cancer; tumour evolution; Big Bang model; intra tumour heterogeneity (ITH)

Abstract

Multi disciplinary management of cancer has enabled a comprehensive involvement of clinicians in disease management. For the surgeon involved in colorectal cancer (CRC) management it is pertinent to possess a basic knowledge in tumour biology for effective participation. Several models exist to explain the intra tumour heterogeneity (ITH) seen in cancers; clonal expansion, big-bang theory and the cancer stem cell theory. All of these aim to describe the extreme variability seen within cell populations in solid tumours and their implications on clinical management. This review aims to provide the practising surgeon a basic knowledge of colorectal tumour biology and their implications in clinical phenomena.

Introduction

Colorectal cancer currently ranks as the third most diagnosed cancer and the fourth leading cause of cancer related deaths in the world (1). The incidence of the disease has increased with countries achieving a higher developmental index. A similar pattern has been observed in Sri Lanka over the past few decades where the incidence has increased from 3.8 in year 2000 to 5.6 in year 2010 per 100,000 population (2,3) .

In an era of multi disciplinary management, it is important for the surgeon to acquire a basic understanding of the biological process behind the evolution of cancer, for decision-making purposes. An understanding of the origin and the life cycle of cancer helps to formulate treatment pathways, plan surgery and develop follow up protocols in the clinical setting.

The process of carcinogenesis involves the transformation of a cell into one that abnormally proliferates and loses its inhibitory mechanisms resulting in uncontrolled growth of tissue. Along with uncontrolled growth, invasion in to adjacent structures and the ability to metastasize to distant sites are the hallmark of a malignancy. Normal cells undergo a well-regulated cell cycle to divide and replace aging cells. The cell cycle regulatory mechanisms that are in place to prevent unscheduled division and the checkpoints to detect them become defective during the process of carcinogenesis due to a multitude of internal or environmental factors.

The three principle defects identified in cancer cells are: unscheduled proliferation, genomic instability (GIN) and chromosomal instability (CIN)(4). Unscheduled proliferation occurs due to acquisition of mitogenic (cell division) signals or loss of anti mitogenic signals due to a number of external and internal factors such as toxins, radiation or heredity. A cell or a group of cells, which has increased proliferation, acquires more genetic mutations in its DNA due to increased replication stress. They also acquire numerical changes (addition or deletion) in chromosomes leading to aneuploidy. However, under normal circumstances most of the cells that acquire mutations will be either repaired or diverted to apoptosis at 'DNA damage checkpoints' that inhibit intra-cellular enzymes; cyclin dependent kinases (CDK) (5). When the checkpoints are defective, these changes accumulate with a 'snow balling' effect leading to the development of aggressive clone of tumour cells.

It is well recognized that a 'tumour' possesses a significant degree of heterogeneity within its cell population that is referred to as “intra tumour heterogeneity' (ITH) (6,7) , which means that cells derived from a tumour carries varying mutational signatures and functions. This has implications upon tumour behaviour, metastatic potential and drug response characteristics. A well established hypothesis to describe this phenomenon, common to many solid tumours, is the 'clonal selection/ sweep' theory (8). Presence of a “cancer stem cell” as the cause for the ITH has also evolved based on observations made in haematological malignancies (9). In the recent past this has been challenged with regard to colorectal cancer (CRC) evolution, where by, scientists suggest that the genomic heterogeneity seen within the tumour existed from the point of origin; hence the term 'big bang model' (10). In this review we discuss the details of the available theories on

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colorectal cancer evolution and the evidence that support them.

Clonal expansion

A transformed cell (cancer cell) that undergoes repeated divisions is thought to give rise to varied cell populations with different mutations. This theory suggests a scenario where progressive acquisition of non-lethal mutations (mutations that do not cause cell death) give rise to a malignant clone of cells which carries a proliferative advantage over the rest (8) . The more aggressive cell type (or clone) will then express an enhanced growth pattern over the other clones. This clone becomes the dominant clone. With the progress of the tumour new mutations take place, giving rise to more virulent clones

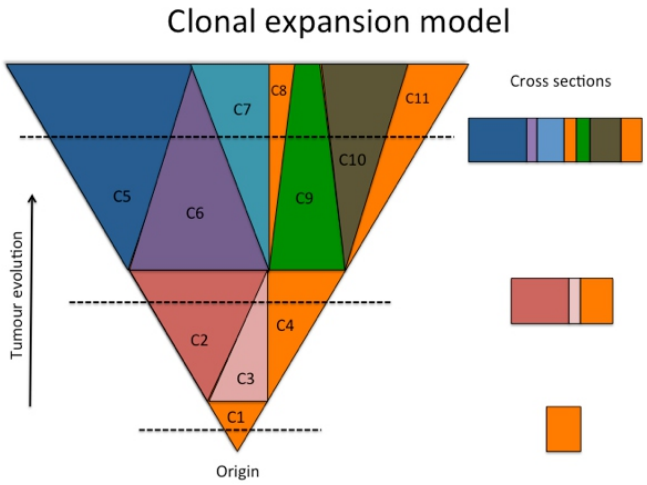

Figure 1. Intra tumour heterogeneity explained by clonal expansion model. Cross sections at different time points will demonstrate distinct compositions as some clones gain dominance compromising others during the evolution

of cells that take over the tumour cell population (Figure 1).

The intra tumour cellular variation observed is a result of such varied populations. This hypothesis is in line with the Darwinian theory of 'natural selection'. According to the clonal expansion theory the composition of the tumour that is clinically detected will be almost completely different from the initial malignant transformation. The tumour will consist of a dominant clone along with few suppressed clones and the composition is time dependent; that is, if the same tumour is detected at a different time point (earlier or later), its' composition will not be the same.

Cancer 'stem cell' theory

The stem cell theory hypothesis has aroused much debate. It is important to have a basic knowledge on the arrangement of a colonic crypt to understand the stem cell theory. A normal colonic crypt contains undifferentiated (pluripotent) stem cells at its' base (Figure 2). These cells give rise to differentiated colonic epithelial cells with secretory and absorbing capabilities. The differentiated cells move toward the top of the crypt as they mature (Figure 2). The group of

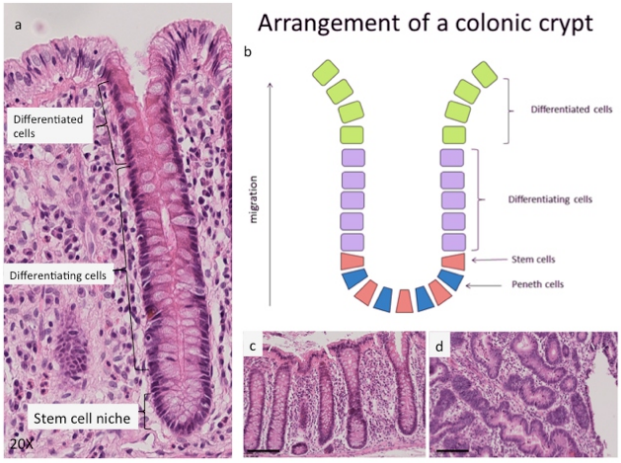

Figure 2. The cellular structure of a colonic crypt: a) H&E stained normal colon crypt (20X) to demonstrate the complementary regions shown in the b) schematic representation. The stem cell niche which is inter located with Paneth cells and the migration of differentiated epithelial cells to the surface; c) the histological appearance of a normal colonic mucosa in contrast to a d) carcinoma of the colon with distorted crypt architecture (scale bar - 500µm).

stem cells at the bottom of the crypt, called the 'stem cell niche', self perpetuates and continues to replace the mature cells that undergo apoptosis over time. These cell types can be differentiated by markers such as LGR5 (cell surface marker) for stem cells and KI-67 (intra cellular protein) for differentiating/ replicating cells. Interestingly there exist two theories for the origin of cancer stem cells. One theory suggests that the stem cells at the crypt transform in to cancer stem cells while the other suggests that mature epithelial cells de-differentiate in to stem cells during malignant transformation (11,12).

The cancer stem cells are believed to function as the normal pluripotent stem cells (with the ability to differentiate to any mature cell type). They are believed to give rise to multi potent 'progenitor' cells that in turn divide in to well-differentiated malignant cells that make up the bulk of a tumour (Figure 3). Cancer stem cells were discovered in haematological malignancies when researchers observed that only a certain sub population of cells was able to reproduce the disease when injected in to immune-compromised mice (9). Later on this theory was applied to solid tumours including breast and colorectal cancers. The ‘stem cells’ themselves do not possess malignant properties. They self replicate at a normal pace and feed the tumour mass with differentiated malignant cells. The stem cells are recognized in a tumour by the presence of intracellular molecules such as that similar to embryonic stem cells (13). These molecules ensure that they maintain pluripotency and self replication.

'Big bang' model

The big bang model of CRC evolution is a novel theory put forward by Sottoriva and colleagues (10). They suggest that

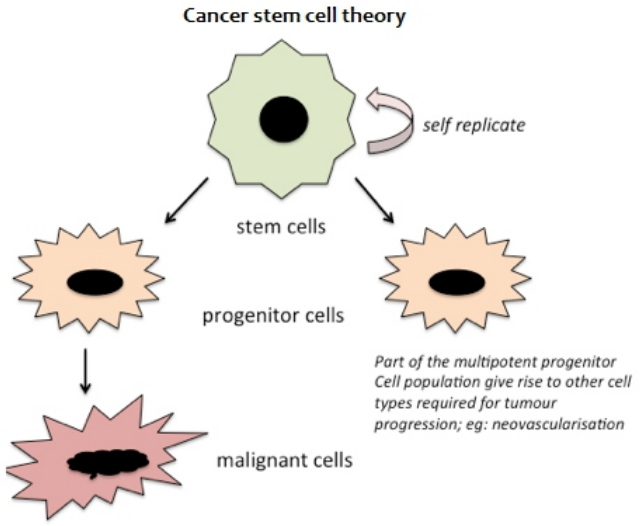

Figure 3. Hierarchical arrangement of cell populations described in the cancer stem cell model. The progenitor cells unequally divide in to malignant cells and other mesenchymal cell populations required for tumour progression.

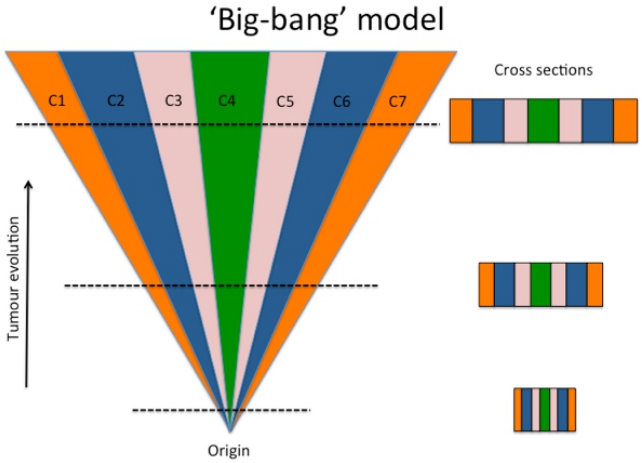

Figure 4. Tumour evolution according to the big-bang model where the principle clones are consistent from the origin. Cross sections at different time points in the life cycle are comparable as there are no clonal sweeps.

the heterogeneity seen in the cell populations in a mature tumour is a reflection of what took place at the initial transformation process within a single crypt, which resulted in several clones of malignant cells (Figure 4). The name 'big bang' was inspired by its similarity to the widely accepted evolution theory of the cosmos. It could be viewed as a progression of the transformed clones, and not sweeps, along the tumour life cycle. However small sub populations of different cells could appear along the life cycle which they called 'private mutations'. These clones do not become dominant in the mature tumour. The authors used sequencing data from single crypts from different sites of tumours and also used DNA methylation changes to prove that the heterogeneity has evolved from a primary transformation. They used a complex mathematical model to work back to the origin of the tumour from the available information (10).

The clonal expansion and cancer stem cell model are commonly applicable to most solid and haematological malignancies. However the 'big bang' model has been demonstrated only in relation to CRC. Although researchers have been able to demonstrate characteristics of all the above biological models occurring within CRCs it is too early to fully accept any one theory. Moreover the possibility of a combination of these models being present in a single tumour has not been excluded. A cancer could in theory have a stem cell niche that feeds the tumour with differentiated cells and could also demonstrates clonal expansion amongst its differentiated cell populations. The appearance of stem cells could happen in a big bang model where the 'stemness' is acquired at the initiation and remains consistently through out the cycle. At present there is a large volume of research taking place in this field to accurately explain the tumour evolution.

Clinical implications of tumour evolution biology

It is common in clinical practice to encounter a wide variety of tumour behaviours. The cancer cell heterogeneity may explain this differential behaviour of the tumours of similar origin. The difference in metastatic potential and recurrence of tumours of common origin amongst patients is due to the chance appearance of aggressive sub clones with varying phenotypes. A colorectal cancer in one patient might not metastasize even with local invasion while another patient will present with liver metastasis from an early primary tumour (14) . The appearance of a sub clone with a tumour cell population with reduced adherence, increased vascular migration and a potential to re-implant at a distant site could occur at an early stage of tumour development giving rise to metastasis. The phenomenon of carcinoma of unknown primary (CUP) could also be explained using the 'big bang' model. A single crypt unit that undergoes malignant transformation may harbour a metastatic clone from the origin that results in metastasis without a detectable primary tumour.

Another major implication of ITH is in relation to chemo resistance. Due to varied mutational landscape in cell populations, a varied response to chemotherapy could be observed (15) . When the sensitive clones are destroyed by therapy, a resistant clone will begin to proliferate at a higher rate-giving rise to the phenomenon of chemo resistance.

Cancer stem cell theory is largely implicated in explaining resistance to chemotherapy (16) . Most chemotherapy agents that are in clinical use target rapidly replicating cells . They are designed to target the DNA and cell cycle regulating molecules that ultimately results in the death of the cells (17). As cancer stem cells are a slow replicating, non-malignant cell population they remain unaffected by these agents. Once the bulk of malignant cells are destroyed by chemotherapy these stem cells start to produce a new generation of malignant cells that can withstand the effect of the drug.

Hence this could explain the secondary resistance that we observe in clinical practice. Same hypothesis can be applied to incomplete response to radiotherapy, as stem cells do not replicate faster.

Tumour heterogeneity is currently addressed as a spatiotemporal phenomenon (18). The diversity in cell populations within a single tumour or between the primary and the secondary is described by spatial heterogeneity. Diversity seen in a tumour over time is explained by temporal heterogeneity. This implies that in the same patient a primary tumour and metastases may demonstrate different sensitivity patterns while the sensitivity is also dependent on the lag between occurrence and detection. The heterogeneity seen in tumours can also affect histopathological diagnosis (6). If biopsies from a single region are used to assess the presence of tumour markers such as k-RAS the results could be biased, as some clones might not have the mutated form.

Currently cancer management is shifting towards a personalized treatment where each patient is assessed and prescribed an individual treatment plan based on the biological characteristics of their tumours (19). Advent of biological / targeted therapy is a part of this transformation. ITH is mostly related to biological treatment since the specific molecular target might be differentially expressed within a tumour rendering it resistant or partially resistant to these agents. Proper assessment of the tumour characteristics is therefore of utmost important prior to administering these toxic and expensive medication which can result in severe side effects and a burden on the health system.

Conclusion

A colorectal cancer is a complex biological entity. It harbours cell populations with different genotypic and phenotypic characteristics and the behaviour of the tumour is decided by a confluence of these. The varied presentation, inconsistent response to medication and unpredictable recurrence patterns of colorectal cancer can be explained by understanding the variability in the biological process. The understanding of the exact evolutionary process of colorectal cancer is far from complete. The biological phenomenon described by clonal expansion, big-bang model and stem cell hypothesis may all co-exist within a tumour. It is of relevance that the surgeon is updated with the accumulating body of evidence in this area of science in order to make more informed collective decisions during multi disciplinary management of colorectal cancer.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, et al. Fact Sheets by Cancer. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet].Lyon, France: International Agency for Research on Cancer; 2013. 2013. p. 4.
2. Ministry of Health. Cancer Incidence Data: Sri Lanka 2010 | GHDx [Internet]. [cited 2018 May 12]. Available from: http://ghdx.healthdata.org/record/cancer-incidence-data-sri-lanka-2010
3. Chandrasinghe PC, Ediriweera DS, Hewavisenthi J, Kumarage SK, Fernando FR, Deen KI. Colorectal cancer burden and trends in a South Asian cohort: Experience from a regional tertiary care center in Sri Lanka. BMC Res Notes. 2017;10(1). doi.org/10.1186/s13104-017-2869-1
4. Malumbres M, Barbacid M. Cell cycle, CDKs and cancer: a changing paradigm. Nat Rev Cancer. Nature Publishing Group; 2009 Mar 1;9(3):153–66.
5. Bartek J, Lukas C, Lukas J. Checking on DNA damage in S phase. Nat Rev Mol Cell Biol. 2004 Oct 1;5(10):792–804. doi.org/10.1038/nrm1493
6. Gay L, Baker A-M, Graham TA. Tumour Cell Heterogeneity. F1000Research. Faculty of 1000 Ltd; 2016;5.
7. Sottoriva A , Barnes C P , Graham T A. Catch my drift ? Making sense of genomic intra-tumour heterogeneity. Biochim Biophys Acta. Elsevier; 2017;1867(2):95–100.
8. Nowell PC. The clonal evolution of tumor cell populations. Science. 1976 Oct 1;194(4260):23–8. doi.org/10.1126/science.959840
9. Kreso A, Dick JE. Evolution of the Cancer Stem Cell Model. Cell Stem Cell. Cell Press; 2014 Mar 6;14(3):275–91.
10. Sottoriva A, Kang H, Ma Z, Graham TA, Salomon MP, Zhao J, et al. A Big Bang model of human colorectal tumor growth. Nat Genet. 2015;47(3):209–16. https://doi.org/10.1038/ng.3214
11. Chaffer CL, Brueckmann I, Scheel C, Kaestli AJ, Wiggins PA, Rodrigues LO, et al. Normal and neoplastic nonstem cells can spontaneously convert to a stem-like state. Proc Natl Acad Sci. 2011 May 10;108(19):7950–5. doi.org/10.1073/pnas.1102454108
12. Zheng S, Xin L, Liang A, Fu Y. Cancer stem cell hypothesis: a brief summary and two proposals. Cytotechnology. Springer Netherlands; 2013 Aug 19;65(4):505–12. doi.org/10.1007/s10616-012-9517-3
13. Rich JN. Cancer stem cells. Medicine (Baltimore). 2016 Sep;95:S1. https://doi.org/10.1097/MD.0000000000004558
14. Sugimoto K, Kawai M, Takehara K, Tashiro Y, Munakata S, Ishiyama S, et al. T1 colorectal cancer with synchronous liver metastasis. Case Rep Gastroenterol. Karger Publishers; 2013 May;7(2):266–71. https://doi.org/10.1159/000353635
15. Carter P, Alifrangis C, Cereser B, Chandrasinghe P, Belluz LB, Herzog T, et al. Does molecular profiling of tumors using the Caris molecular intelligence platform improve outcomes for cancer patients? Oncotarget. 2018;9(10). doi.org/10.18632/oncotarget.24258
16. Dean M, Fojo T, Bates S. Tumour stem cells and drug resistance. Nat Rev Cancer. Nature Publishing Group; 2005 Apr 1;5(4):275–84.
17. Malhotra V, Perry MC. Classical Chemotherapy: Mechanisms, Toxicities and the Therapeutc Window. Cancer Biol Ther. Taylor & Francis; 2003 Mar 27;2(sup1):1–3.
18. Dagogo-Jack I, Shaw AT. Tumour heterogeneity and resistance to cancer therapies. Nat Rev Clin Oncol. Nature Publishing Group; 2017 Nov 8;15(2):81–94. doi.org/10.18632/oncotarget.24257
19. Carter P, Alifrangis C, Chandrasinghe P, Cereser B, Belluz LB, Leo CA, et al. The benefit of tumor molecular profiling on predicting treatments for colorectal adenocarcinomas. Oncotarget. 2018;9(13). https://doi.org/10.18632/oncotarget.24257

REVIEW ARTICLE

Evaluation of potential live donors for renal transplant: an evidence based approach and changing paradigms

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Key words: Kidney transplant; live donor; end stage renal failure; donor safety

Abstract

Live donor renal transplantation remains the mainstay of renal replacement therapy in most countries, including Sri Lanka. The Amsterdam consensus guidelines were considered the benchmark in evaluation of live donors and used in assessing donor suitability for over two decades. However, recent evidence has cast doubts regarding the overall safety of kidney donation warranting a closer look at donor evaluation. This review aims to look at current available evidence regarding common donor conditions and the overall need for extra vigilance in donor evaluation.

Introduction

With an ageing global population and a pandemic of diabetes, the incidence of End Stage Renal Failure (ESRF) has increased steadily across the world. Renal transplantation remains the optimal treatment, with the best outcome regarding survival and quality of life (1,2). However, the rates of deceased organ donation have remained relatively static, causing an increasing disparity between the availability of organs and numbers awaiting transplantation.

Available evidence has demonstrated the benefits of Live Donor Renal Transplant (LDRT) over Deceased Donor Renal Transplants (DDRT), both regarding graft and patient survival. The reported 1-year graft and patient survival after DDRT is 88% and 95% respectively. The corresponding results for LDRT are 94% and 98% respectively, highlighting the overall superiority of LDRT in ESRF(3,4).

Availability of deceased donors, cultural and religious attitudes as well as the level of education regarding safety and efficacy of LDRT, contributes to the vastly different rates of live organ donation in different countries. In Sri Lanka, 80% of transplants are LDRT. Hence, the need for an evidence based, robust, live donor evaluation protocol is imperative to achieve best outcomes while ensuring utmost safety and welfare of donors.

Changing paradigms

Majority of the protocols for live donor evaluation are based on the historical Amsterdam Forum Guidelines(5). This was a landmark meeting with world experts approaching a consensus on the safety and welfare of prospective renal donors. According to available data at the time, the Amsterdam Forum established the perioperative mortality rate associated with live donor nephrectomy to be 0.03%(6). It was also emphasized that kidney donation among carefully selected healthy donors was safe with no significant increase in long-term renal insufficiency or post-donation hypertension(7). This served as a benchmark in decision making, counselling and consenting for LDRT. However, emerging data have shed new light regarding the overall safety profile of kidney donation, warranting a revisit of the earlier guidelines.

Medical and Psychological evaluation and consenting

All potential organ donors should have an individual psychological evaluation to assess their state of mind and psychological stability to proceed with organ donation (8,9). This should also help in excluding coercion and donation for financial gain. Furthermore, all donors should understand that they need to proceed voluntarily and may withdraw at any time during the evaluation process with no requirement for an explanation.

The routine medical evaluation attempts to identify any obvious medical conditions that may preclude donation. It includes the screening for infections in the donor based on absolute contra-indications and regionally prevalent infections. (Table-1 and 2)

Donor age

The lower age limit for organ donation is often an arbitrary limit depending on the local legal framework. Most countries adopt this as either 18 or 21-years . In Sri Lanka, the legal age limit for organ donation is 21-years. However, the government guideline for altruistic donor ages are 25-years (male) and 30-years (female). The higher age limit for female

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Table-1. Routine screening test evaluation of donor

Blood
• Electrolytes, Urea, Creatinine (x2), Uric acid • Calcium, phosphate, Magnesium • Alkaline Phosphatase, total protein, Albumin, bilirubin, AST, ALT, GGT • Fasting blood sugar • Lipid profile • Full blood count and differential, Platelets, INR
Urine
• Urine full analysis (x2) • Midstream urines for culture and sensitivity (x2) • Urines for Albumin creatinine ratio or 24 hour collection for protein excretion
Radiology studies
• Chest X-ray • Electrocardiogram • Abdominal ultrasound • Mammogram for females > 40 years • Nuclear renogram (DTPA) and GFR with differential split
Other
• Blood pressure readings (x3 from family physicians) • PAP smear for females • PSA for men > 45 years • Pregnancy test (if indicated) • Height/weight and BMI • TB skin test

Table-2. Infection screening of donor

Donor Infection screening	
Routine tests	**Selected tests**
Urinanalysis for UTI	
Hepatitis B; HBsAg, HBcAb	coccidiomycosis
Hepatitis C; HCV IgG antibodies	Malaria
HIV; HIV 1 & 2 antibodies	Schistosomiasis
Treponema pallidum antibodies	West nile viris
Cytomegalo virus (CMV) – IgG and IgM	Crutzfeldt Jakob disease and variant
Epsteinbar Virus (EBV) IgG	Strongyloides
Toxoplasma gondii IgG	
Tuburculin skin test	

donors is intended to avoid subsequent pregnancy related complications following kidney donation.

Lower age limit

The importance of a stringent lower age limit takes in to account the length of life an individual has to live post-donation, with the possibility of developing medical conditions (diabetes, hypertension, obesity and immunological disease), that could potentially lead to renal insufficiency with time (11). The Organ Procurement and Transplantation Network (OPTN) data shows that among the previous kidney donors who later developed ESRF, majority had donated over 15 years ago (12).

New data have also shown evidence of gestational complications among females who have donated and had subsequent pregnancies (13). It has demonstrated an increased incidence of pregnancy induced hypertension, eclampsia and preterm labor (14). Hence the local protocol aims to avoid such complications with raising the lower age limit for female donors and females who are planning future pregnancy.

Upper age limit

The upper age limit for donation is governed by the overall health status. With carefully screened and selected donors and age matched recipients, excellent outcomes have been achieved even with donors >60 years. There has been no significant increase in peri-operative morbidity or mortality among such selected older donors (15,16). With the use of laparoscopic donor nephrectomy and shorter post-op recovery times, the number of older donors accepted for donation has increased in Sri Lanka over the past decade. Nevertheless, meticulous selection processes are needed to select such donors, with emphasis on cardiovascular and respiratory functional assessment. This may involve stress echocardiograms, myocardial perfusion studies and respiratory function tests.

The UNOS database 1994 to 2012, comprising over 250,000 transplants, compared outcomes from standard criteria

deceased donors (SCDD), expanded criteria deceased donor (ECDD), and living donors (LD). Transplants from older (>60 years) LD had significantly lower graft and patient survival compared to those from younger LD. Nevertheless, LDRT from LD 60-70 years showed better outcomes compared to SCDD while all older LD transplants showed better outcomes compared to ECDD transplants (17). Donor general health condition and renal function rather than the chronological age should be the determinant of acceptable threshold for donation.

Obesity

Obesity is a proven risk factor for hypertension, diabetes, hypercholesterolaemia, Ischemic heart disease IHD, stroke and ESRF in the general population (18). Furthermore, obesity has been clearly linked to reduced life expectancy compared to the non-obese. Retrospective data has shown that among obese (BMI >30 kg/m2) donors, 60% would develop significant proteinuria (>3g/d) and 30% would develop renal insufficiency, 10 years post-donation (19).

Several retrospective studies have shown a minor but definite increase in minor peri-operative complications among obese donors. These include increased operative times, increased conversion to open nephrectomy and increase of surgical site infections. There has been no definite evidence of increased donor mortality based on obesity.

While donation appears safe among the moderately obese (BMI 30-35) but otherwise healthy donors, they should be advised regarding weight reduction pre-donation and weight control post-donation. Those who fall under the very obese (BMI >35) category should be discouraged from donation.

Hypertension

Hypertension is a recognized risk factor for chronic kidney disease (CKD) and ESRF (20). Hence the donor evaluation should aim to identify potential donors with established hypertension. The initial clinical assessment could be by simple blood pressure measurement on three different occasions or by ambulatory blood pressure monitoring (ABPM) (21,22). Established hypertension is defined as a systolic pressure >140 mmHg and/or diastolic pressure >90 mmHg.

- Individuals with blood pressure >140/90 mmHg by ABPM are not acceptable as donors.
- Individuals with easily controlled hypertension (1-2 anti-hypertensives) who are carefully selected (age >50 years, GFR ≥80 mL/min/1.73m^2, urinary albumin <30 mg/day, no signs of end organ damage) are a low-risk group and may be acceptable as donors.
- End-organ damage is detected by screening for left ventricular hypertrophy, retinopathy or proteinuria. Presence of any one of these precludes donation.
- Difficult to control hypertension (requiring >2 anti-hypertensives) are also excluded from donation.

Nephrolithiasis

The worldwide prevalence of asymptomatic nephrolithiasis in the general population varies between 10-12% (23). The routine use of CT scan to evaluate potential donors has led to increased detection of such asymptomatic nephrolithiasis. When evaluating such donors, the lifetime risk of developing recurrent stones and possibility of urosepsis and obstructive uropathy with renal functional deterioration needs to be assessed.

Symptomatic stone bearers in the general population, carry a 50% risk of recurrent stones within 5-years (24). Hence, donors with current symptomatic nephrolithiasis should be precluded from donation.

Donors with a *history of single* stone may be considered if:

- Metabolic screening excludes significant metabolic abnormality that increases the risk of recurrent stones (hypercalcuria, hyperuricemia, metabolic acidosis, hypocitraturia, cystinuria, hyperoxaluria)
- CT scan shows no evidence of multiple stones, nephrocalcinosis
- Donors with *minor correctable metabolic abnormalities* (hypocitratuiria, hypercalciuria) may be considered once treated, after careful counselling
- Donor with *asymptomatic current stone/s* may be considered if:
- Metabolic screening and CT imaging is negative as above
- Current largest stone is <1.5 cm, potentially removable during transplant
- If more than one stone, they should all be limited to one kidney and that kidney should be extracted for donation

The following are contra-indications to donate:

- Nephrocalcinosis on imaging
- Multiple bilateral stones
- Large stones (>1.5 cm)
- Stone types that have high recurrence rates (cystine, struvite stones)

Small stones (<5 mm) may be safely left behind and transplanted with minimal risk. It is likely to be spontaneously passed with post-transplant polyuria in the recipient, especially if located in the upper or middle calyx. Any larger stone or stones in the lower calyx should ideally be extracted ex-vivo by flexible ureteroscopy (9).

Diabetes

All prospective donors should have a fasting blood sugar

(FBS) or HBA1C assessment in the preliminary workup. A FBS of >7 mmol/L (HBA1C >6.5%) indicates established diabetes while 6.1-6.9 mmol/L indicates impaired glucose tolerance (IGT) and warrants further testing with oral glucose tolerance test (OGTT). Prospective donors with additional risk factors for type-2 diabetes (family history, obesity, history of gestational diabetes, hyperlipidaemia, hypertension) should also have a mandatory OGTT. A 2-hour OGTT value >11.1 mmol/L indicates established diabetes.

Established diabetes is considered a contra-indication to donation among most centers. Impaired glucose tolerance is a relative contra-indication and may proceed to donation provided there are no additional risk factors and there is suitable follow-up plan available in the local set-up.

Cardiac assessment

Similar to any major operation, donor nephrectomy requires a preliminary cardiac assessment to determine the fitness for operation. Furthermore, it also allows evaluation of baseline cardiac status and thereby makes assessments regarding the possible long-term effects of living with a single kidney.

All prospective donors should have a detailed clinical examination and electrocardiogram as a baseline. A transthoracic echocardiogram is recommended to supplement the above findings. Currently, there is no evidence of stress echocardiograms in all donors, especially those who are at low cardiac risk (9,25).

Donors who are at higher risk (smoking, hyperlipidaemia, personal or family history of IHD, low exercise capacity) need individualised discussion at the multi-disciplinary meeting with contribution from cardiologists. Accordingly, further targeted cardiac testing can be done including stress echocardiogram and CT coronary calcium scoring.

Familial diseases

Presence of familial inherited diseases should be excluded during live-related renal transplant. It requires a detailed family history, pedigree and a high index of suspicion regarding subclinical renal disease and extra-renal manifestations. This allows to rule out the possibility of subclinical disease in the donor which may lead to renal insufficiency post-donation.

Autosomal Dominant Polycystic Kidney Disease (ADPKD)

ADPKD is the commonest familial renal disease resulting in ESRF. Where a first-degree family member of a patient is being evaluated for donation, extreme care is needed to exclude disease in the donor.

Ultra-sound scan (USS) criteria for diagnosing ADPKD and thereby precluding donation include (26);

- ≥ 3 renal cysts in total (age 15 – 39),
- ≥ 2 cysts in each kidney (age 40 – 59),
- ≥ 4 cysts in each kidney (age ≥60).

A negative USS in those >40 years excludes the disease and is safe to proceed with donation. In those aged 20-40, more sensitive imaging with CT/MRI is required. CT/MRI evidence of >10 cysts is considered positive while <10 cysts is used for exclusion of disease. When imaging results are equivocal, genetic screening for the ADPKD mutation should be performed. Donor Renal Function

The screening test for donor renal function is measurement of serum creatinine and estimated Glomerular Filtration Rate (eGFR). More accurate functional assessment requires 24-hour urinary collection and clearance of 51Cr-EDTA (or inulin) (9).

Assessment of split renal function by radio-isotope study allows for identification of contribution from each kidney for overall function. This is especially useful in the presence of significant size discrepancy between kidneys (>10%). Considered along with other anatomical factors, the kidney with lower GFR is usually selected for donation.

Normal kidney function and change with aging

The GFR in a healthy individual remains stable up to about 40 years, after which it shows an age-related decline; 6.6 - 7.7 mL/min/year in males and females respectively(27). Post-donation, although the remnant kidney shows a compensatory increase in function, it does not match pre-donation GFR. Donors have been shown on average to have a GFR loss of 26 mL/min post-donation, achieving 65-75% of the pre-donation GFR(28,29). This information is used in deciding the threshold renal function for donation, ensuring the prospective donors GFR remains in the lower normal range for age.

Earlier donor guidelines were based on the findings that, despite a reduced GFR, the incidence of ESRD among donors were either similar or even lower than the general population. However, newer studies that compared donor outcomes with those of matched non-donors who would have otherwise been eligible to donate have shed new light in this regard. Muzaale and colleagues compared 96,000 donors (mean follow-up 9 years) with matched healthy controls(30). The risk of ESRD was 31/10,000 among donors and 4/10,000 among controls. Lifetime risk of ESRD was 90/10,000 (donors), 326/10,000 (general population), and 14/10,000 (matched non-donor controls)(31). Hence although the risk of long-term ESRF is not significantly higher than the general population, it is higher compared to well-matched non-donor controls (Figure-1). This becomes pertinent when considering younger donors with greater life-years ahead post-donation. Hence the guidelines on the lowest threshold GFR for donation are based on donor age. (Table-3)

Table-3. Recommended age-specific GFR threshold for donation

AGE (Years)	Threshold GFR (ml/min/1.73m²)	
	Male	Female
20-29	90	90
30-34	80	80
35	80	80
40	80	80
45	80	80
50	80	80
55	80	75
60	76	70
65	71	64
70	67	59
75	63	54
80	58	49

Proteinuria

Proteinuria is an independent risk factor for ESRF and cardiovascular mortality. Hence, all potential donors require accurate assessment and quantification of proteinuria. According to Amsterdam guidelines, the threshold for the acceptable donation was 24-hour urinary protein excretion of <300 mg(32). Although it remains the gold standard, a 24-hour urinary collection is cumbersome and laden with errors. Hence currently recommended alternative tests are spot urine assessment for albumin/creatinine ratio (ACR) or protein/creatinine ratio (PCR) (9).

Overt proteinuria (ACR >30 mg/mmol, PCR>50 mg/mmol) is a marker of future cardiovascular mortality and progression to ESRF, considered an absolute contra-indication to donate. Moderate proteinuria (ACR 3-30 mg/mmol, PCR 15-50 mg/mmol) is a relative contra-indication. Benign causes of proteinuria (urinary tract infection UTI, febrile illness, vigorous exercise, orthostatic proteinuria) need to be considered in otherwise healthy donors. If identified, the cause needs to be rectified and the test repeated to establish complete resolution before donating. In suspected orthostatic proteinuria, a sample immediately after waking needs to be assessed before donation.

Hematuria

All donors need to have basic urinalysis including at least two separate reagent strip tests in the screening stage. Non-visible haematuria (NVH)/(microscopic haematuria) has a prevalence of up to 20% in the general population(33). Persistent NVH hematuria in a donor requires more rigorous investigation after excluding benign causes such as infection, strenuous exercise and menstruation.

Further investigation of NVH aims to exclude urological disease (calculi, inflammation, carcinoma) and glomerular disease. These include urine culture (including tuberculosis), cytology and CT imaging. If these are negative, a flexible cystoscopy is indicated for all potential donors >40 years(9). If still negative and the donor remains committed, a renal biopsy is needed to exclude glomerular disease. The presence of red cell casts, proteinuria and dysmorphic red cells are suggestive of glomerular pathology. A positive glomerular disease on biopsy will preclude donation.

Thin basement membrane disease (TBMD) can be diagnosed in 10-50% of patients undergoing biopsy for persistent NVH(34). This is considered benign and donors who have donated with TBMD have not demonstrated any definite progression to ESRF. Nevertheless, such donors should only be considered in exceptional circumstances and should be educated regarding the limited long-term available data.

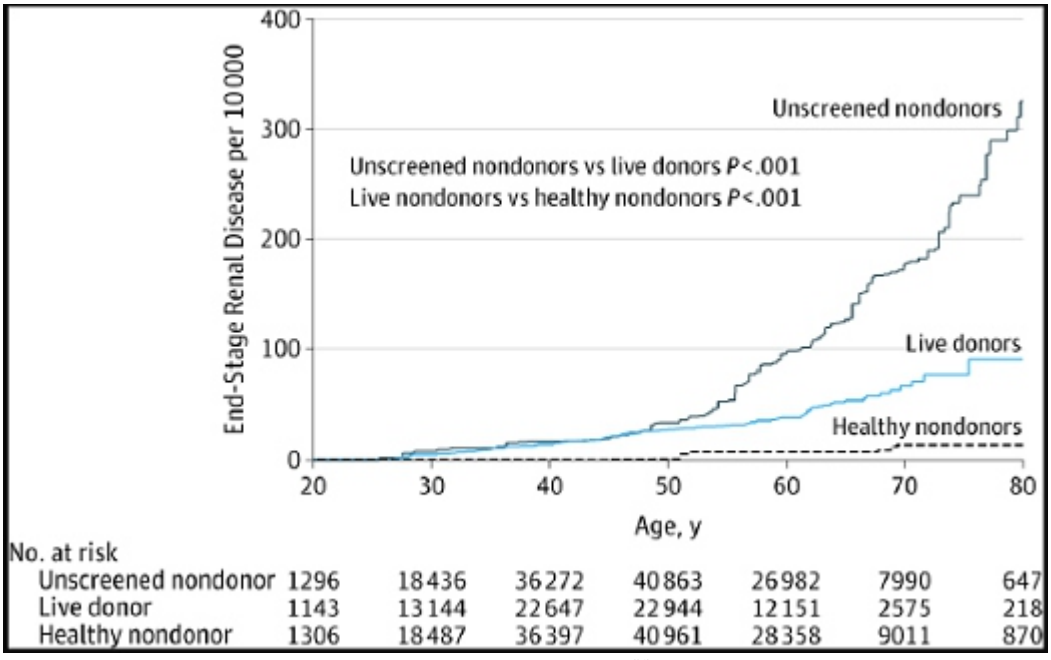

Figure-1. Risk of ESRF post-donation [31]

Pyuria

Significant pyuria (>10 white cells/mm3) should be investigated, and donation should only proceed if it can be attributed to a benign reversible cause and confirmation of such after appropriate treatment. Asymptomatic pyuria is common in the general population (2.6% of men, 13.9% of women)(35,36). The commonest reason is UTI which needs to be excluded by urinary culture.

The most frequent reasons for sterile pyuria include atypical infections (fungal, tuberculosis etc.), partially treated UTI, calculi, stents, prostatitis etc. In the local set-up with a higher prevalence of tuberculosis, genito-urinary tuberculosis should be excluded by 3 consecutive early morning samples. If no identifiable cause is found for persistent pyuria, it warrants renal biopsy to exclude interstitial nephritis or pyelonephritis, both of which are contra-indications for donation.

Radiologic Evaluation

Contrast CT abdomen including CT angiogram is mandatory before donation. This can visualize the renal parenchyma, the presence of cysts, calculi, arterial, venous and ureteric anatomy. It allows precise characterisation of the anatomy in deciding suitability, best operative approach and which kidney to harvest for donation etc.

Kidney donation is contraindicated in the presence of a gross parenchymal anomaly, horseshoe kidney, multiple bilateral cystic disease or complex septated cyst, angiomyolipoma or nephrocalcinosis, multiple bilateral calculi.

Donor Smoking, alcohol and substance abuse

As for any major surgery, active smoking becomes a risk factor for increase peri-operative morbidity. It also becomes an added risk factor for those who are obese or hypertensive. The Amsterdam forum recommends smoking cessation at least 4-weeks before the donation which is the standard practice in our programme. Furthermore, these donors should be enrolled in smoking cessation clinics for sustained abstinence to minimise future risks.

Donors with a history of regular alcohol use should be evaluated to exclude hepatic insufficiency that would preclude donation(37). Potential donors who are engaged in substance abuse are excluded from donation.

Hypercoagulability

Prospective donors with a history of venous thrombo-embolism (VTE), family history of thrombophilia or females with recurrent miscarriages should have a thrombophilia screen. This includes an assessment of protein C and S levels, antithrombin III, factor-V Leiden mutation, anti-cardiolipin antibody, lupus anticoagulant, prothrombin gene mutation and homocysteine levels. History of recurrent VTE or positive thrombophilia requiring chronic anticoagulation are contraindications for donation.

Conclusion

Live donors remain the mainstay of renal transplantation in most countries including Sri Lanka. While a more comprehensive standardized deceased donor program is evolving, live donors still far outweigh the deceased donors. Although live donation remains safe, meticulous evaluation and screening are required to ensure long-term safety and well-being of the donor. Furthermore, stringent post-donation follow-up with attention to renal function as well as overall general medical health will contribute to minimising long-term risks to such donors.

Table-4. Contra-indications to donate

Exclusion Criteria for donation

Medical:

- Age < 18 (Individual cut-off of 25yrs for male and 30-yrs for females in altruistic donation)
- Significant renal disease in the past
- High risk of renal disease post-donation, proteinuria, albuminuria over recommended threshold
- Inadequate GFR according to age-related cut off
- Uncontrolled hypertension
- Prohibitive nephrolithiasis
- Morbid obesity
- Established Diabetes
- Significant uncontrolled medical illness, infection
- Logistical problems in obtaining long-term follow up

Psychosocial:

- Inability to give informed consent
- Psychosocial instability
- Coercion
- Evidence of financially driven donation

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Kasiske B, Zeier M, Craig J. KDIGO clinical practice guideline for the care of kidney transplant recipients. Am J Transplant. 2009;9(3):S1-155.
2. Abecassis M, Bartlett ST, Collins AJ, Davis CL, Delmonico FL, Friedewald JJ, et al. Kidney transplantation as primary therapy for end-stage renal disease: a National Kidney Foundation/Kidney Disease Outcomes Quality Initiative (NKF/KDOQITM) conference. Clin J Am Soc Nephrol. 2008;3(2):471–80. doi.org/10.2215/CJN.05021107
3. Collins AJ, Foley RN, Herzog C, Chavers B, Gilbertson D, Ishani A, et al. US renal data system 2012 annual data report. American Journal of Kidney Diseases. 2013;61(1 SUPPL.1). doi.org/10.1053/j.ajkd.2012.11.031
4. Collins A J, Foley R N, Herzog C, Chavers B M, Gilbertson D,

Ishani A, et al. Excerpts from the US Renal Data System 2009 Annual Data Report. Am J Kidney Dis. 2010;55(1 Suppl 1). doi.org/10.1053/j.ajkd.2009.10.009

5. Delmonico F, Council of the Transplantation Society. A Report of the Amsterdam Forum On the Care of the Live Kidney Donor: Data and Medical Guidelines. Transplantation. 2005 Mar 27;79(6 Suppl):S53-66.
6. Davis CL. Living Kidney Donors: Current State of Affairs. Adv Chronic Kidney Dis. 2009;16(4):242–9. doi.org/10.1053/j.ackd.2009.05.007
7. Abecassis M, Adams M, Adams P, Arnold RM, Atkins CR, Barr ML, et al. Consensus statement on the live organ donor. JAMA. 2000;284(22):2919–26. doi.org/10.1001/jama.284.22.2919
8. Dew MA, Jacobs CL, Jowsey SG, Hanto R, Miller C, Delmonico FL. Guidelines for the psychosocial evaluation of living unrelated kidney donors in the United States. In: American Journal of Transplantation. 2007. p. 1047–54. doi.org/10.1111/j.1600-6143.2007.01751.x
9. BTS / RA Living Donor Kidney Transplantation Guidelines 2018.
10. Delmonico FL, Dew MA. Living donor kidney transplantation in a global environment. Vol. 71, Kidney International. 2007. p. 608–14. doi.org/10.1038/sj.ki.5002125
11. Kher A, Mandelbrot DA. The living kidney donor evaluation: ocus on renal issues. Clin J Am Soc Nephrol. 2012 Feb;7(2):366–71. doi.org/10.2215/CJN.10561011
12. Gibney EM, King AL, Maluf DG, Garg AX, Parikh CR. Living kidney donors requiring transplantation: Focus on African Americans. Transplantation. 2007;84(5):647–9. doi.org/10.1097/01.tp.0000277288.78771.c2
13. Garg AX, Nevis IF, McArthur E, Sontrop JM, Koval JJ, Lam NN, et al. Gestational Hypertension and Preeclampsia in Living Kidney Donors. N Engl J Med. 2015;372(2):124–33. doi.org/10.1056/NEJMoa1408932
14. Majak GB, Reisæter AV, Zucknick M, Lorentzen B, Vangen S, Henriksen T, et al. Preeclampsia in kidney transplanted women; Outcomes and a simple prognostic risk score system. PLoS One. 2017;12(3):e0173420. doi.org/10.1371/journal.pone.0173420
15. Dols LFC, Kok NFM, Roodnat JI, Tran TCK, Terkivatan T, Zuidema WC, et al. Living kidney donors: Impact of age on long-term safety. Am J Transplant. 2011;11(4):737–42. doi.org/10.1111/j.1600-6143.2011.03465.x
16. Toyoda M, Yamanaga S, Kawabata C, Hidaka Y, Inadome A, Arakane F, et al. Long-term safety of living kidney donors aged 60 and older. In: Transplantation Proceedings. 2014. p. 318–20. doi.org/10.1016/j.transproceed.2013.11.019
17. Mandelbrot DA, Pavlakis M, Danovitch GM, Johnson SR, Karp SJ, Khwaja K, et al. The medical evaluation of living kidney donors: A survey of US transplant centers. Am J Transplant. 2007;7(10):2333–43. doi.org/10.1111/j.1600-6143.2007.01932.x
18. Johansen KL, Lee C. Body composition in chronic kidney disease. Vol. 24, Current Opinion in Nephrology and Hypertension. 2015. p. 268–75.
19. Chertow GM, Hsu C, Johansen KL. The Enlarging Body of Evidence: Obesity and Chronic Kidney Disease. J Am Soc Nephrol. 2006 Jun 1;17(6):1501–2. doi.org/10.1681/ASN.2006040327
20. Cerasola G, Mulè G, Nardi E, Cusimano P, Palermo A, Arsena R, et al. Clinical correlates of renal dysfunction in hypertensive patients without cardiovascular complications: The REDHY study. J Hum Hypertens. 2010;24(1):44–50. doi.org/10.1038/jhh.2009.41
21. Textor SC, Taler SJ, Larson TS, Prieto M, Griffin M, Gloor J, et al. Blood pressure evaluation among older living kidney donors. J Am Soc Nephrol. 2003;14(8):2159–67. doi.org/10.1097/01.ASN.0000077346.92039.9C
22. Young A, Storsley L, Garg AX, Treleaven D, Nguan CY, Cuerden MS, et al. Health outcomes for living kidney donors with isolated medical abnormalities: A systematic review. Am J Transplant. 2008;8(9):1878–90. doi.org/10.1111/j.1600-6143.2008.02339.x
23. Koh LT, Ng FC, Ng KK. Outcomes of long-term follow-up of patients with conservative management of asymptomatic renal calculi. BJU Int. 2012;109(4):622–5. doi.org/10.1111/j.1464-410X.2011.10329.x
24. Burgher A, Beman M, Holtzman JL, Monga M. Progression of nephrolithiasis: long-term outcomes with observation of asymptomatic calculi. J Endourol. 2004;18(6):534–9. doi.org/10.1089/end.2004.18.534
25. European Renal Best Practice. ERBP Guideline on kidney donor and recipient evaluation and perioperative care. Nephrol Dial Transplant. 2013;28(suppl 2):ii1-ii71.
26. Pei Y, Hwang Y-H, Conklin J, Sundsbak JL, Heyer CM, Chan W, et al. Imaging-Based Diagnosis of Autosomal Dominant Polycystic Kidney Disease. J Am Soc Nephrol. 2015;26:746–53. doi.org/10.1681/ASN.2014030297
27. Weinstein JR, Anderson S. The aging kidney: physiological changes. Adv Chronic Kidney Dis. 2010 Jul;17(4):302–7. doi.org/10.1053/j.ackd.2010.05.002
28. Denic A, Glassock RJ, Rule AD. Structural and Functional Changes With the Aging Kidney. Adv Chronic Kidney Dis. 2016 Jan;23(1):19–28. doi.org/10.1053/j.ackd.2015.08.004
29. Cho HJ, Choi SW, Bae WJ, Kim SJ, Hong SH, Lee JY, et al. Change in renal function following laparoscopic donor nephrectomy using 99 mTc-diethylenetriaminepentaacetic acid scan. World J Urol. 2015 May 25;33(5):719–23. doi.org/10.1007/s00345-014-1408-0
30. Muzaale AD, Massie AB, Wang M-C, Montgomery RA, McBride MA, Wainright JL, et al. Risk of End-Stage Renal Disease Following Live Kidney Donation. JAMA. 2014 Feb 12;311(6):579. doi.org/10.1001/jama.2013.285141
31. Segev DL, Muzaale AD, Caffo BS, Mehta SH, Singer AL, Taranto SE, et al. Perioperative mortality and long-term survival following live kidney donation. JAMA. 2010;303(10):959–66. doi.org/10.1001/jama.2010.237
32. Groth C, Noe L. A Report of the Amsterdam Forum On the Care of the Live Kidney Donor : Data and Medical Guidelines Alliance with the World Health Organization. 2005;79(2):53–66.
33. Kelly JD, Fawcett DP, Goldberg LC. Assessment and management of non-visible haematuria in primary care. Vol. 338, BMJ (Online). 2009. p. 227–32.
34. Savige J, Rana K, Tonna S, Buzza M, Dagher H, Wang YY. Thin basement membrane nephropathy. Vol. 64, Kidney International. 2003. p. 1169–78. doi.org/10.1046/j.1523-1755.2003.00234.x
35. Yacoub R, Akl NK. Urinary tract infections and asymptomatic bacteriuria in renal transplant recipients. J Glob Infect Dis. 2011;3(4):383–9. doi.org/10.4103/0974-777X.91064
36. Alwall N, Lohi A. A POPULATION STUDY ON RENAL AND URINARY TRACT DISEASES. Acta Med Scand. 2009 Apr 24;194(1–6):529–35. doi.org/10.1111/j.0954-6820.1973.tb19486.x
37. Tonnesen H, Rosenberg J, Nielsen HJ, Rasmussen V, Hauge C, Pedersen IK, et al. Effect of preoperative abstinence on poor postoperative outcome in alcohol misusers: randomised controlled trial. BMJ. 1999;318(7194):1311–6. doi.org/10.1136/bmj.318.7194.1311
38. Biglarnia A, Bergqvist D, Johansson M, Wadström J. Venous thromboembolism in live kidney donors-a prospective study. Transplantation. 2008;86(5):659–61. doi.org/10.1097/TP.0b013e3181817d36

BRIEF REPORT

An analysis of operative notes in major surgeries at a teaching hospital

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Key words: Operative notes; major surgeries; operative documentation

Abstract

Introduction

Operative (OP) note is an important document, which should be recorded immediately after surgery. It should be accurate and in detail, for management of the patient and for legal purposes. In our contest, it's written by surgical trainees and supervised by senior surgeons, which is an important part of surgical training.

Materials and methods

We have analysed 215 major surgical OP notes including elective and emergency surgeries in general surgical units, Teaching Hospital Jaffna, from 1st of July 2016 to 31st of December 2016.

Results

All surgeries were performed under general anaesthesia and 83.3 % (n=179) performed by consultants. 90% of OP notes didn't contain time of the surgery, but date of the surgery was mentioned in 82.1% (n=195). Details of surgical team were mentioned in 98.2%, but details of anaesthetic team mentioned in 8.3 %(n=18). Operative diagnosis was missed in 48.8% (n=110) of OP notes. Details of closure technique was not mentioned in 15.5% and none of the notes contained detail of blood loss. Monitoring vital parameters, fluid management and pain management were mentioned 78%, 50%, and 89.9% respectively. Only 6.5% of OP notes were signed by the person who has written.

Conclusion and recommendation

Operative notes were incomplete in most cases. Several areas were identified for further improvement. Pre-designed surgery specific post-operative forms can be used in operating theatres to improve documentation of op notes.

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Introduction

Operative (OP) note is an important document, which should be recorded immediately after surgery. Accurate and detailed operative notes are important in all surgical specialities, not only for patient's safety but also to provide information for research, audit, and medico legal purposes (1).

Traditionally, operative notes have been written by one of the junior members of the scrubbed team, often supervised by a senior surgeon, which considered as an essential part of surgical training. The consultant must make sure that trainees are capable of writing good and acceptable operation notes.

De Zoysa, SK De Silva et al conducted a survey in National hospital Colombo and concluded that considerable bed head tickets (BHT) were lacking adequate descriptions of components such as intraoperative findings, tissue added or removed and closure (2). These inadequacies have been noted in other regions of the world as well (3) and leads to poor post-operative patient management. Studies have shown considerable improvement in the quality of operation notes after the introduction of aide memoires, preformats and electronic templates (4).

There were no published local or national studies available to assess the documentation of surgical operative notes and to compare with the standards set by the Royal College of Surgeons (5). The aim of this retrospective study was to review operative notes in general surgical units in Teaching hospital Jaffna to determine completeness.

Materials and methods

This study was a hospital based retrospective study, conducted in all general surgical units in Teaching hospital Jaffna. The Data were obtained from BHTs for a 6 month period (1st of July 2016 to 30th of December 2016). Ethical clearance was obtained from Ethical review committee, Faculty of Medicine, University of Jaffna. All elective and emergency major surgeries according to BUPA criteria were included in this study. We have used systematic sampling method with sampling interval of one.

Two hundred and fifteen operative notes were compared with the standards published by Royal College of surgeons in Good

surgical practice 2014 (Figure 1).

Our data extraction sheet contained two parts, which were details of surgery and documentation. These data were analysed by SPSS version 21.

Essential elements to be included in the operative notes issued by Royal College of Surgeons – Good surgical practise 2014
1. Date and time
2. Elective/emergency procedure
3. Names of the operating surgeon and assistant
4. Name of the theatre anaesthetist
5. Operative procedure carried out
6. Incision
7. Operative diagnosis
8. Operative findings
9. Any problems/complications
10. Any extra procedure performed and the reason why it was performed
11. Details of tissue removed, added or altered
12. Identification of any prosthesis used, including the serial numbers of prostheses
13. and other implanted materials
14. Details of closure technique
15. Anticipated blood loss
16. Detailed postoperative care instructions
17. Signature

Figure 1. Essential elements of Operative records

Results

All surgeries were done under general anaesthesia.The number of surgeries performed by each category were documented as follows: Consultant 179 (83.3%), senior registrar 8 (3.5%) and registrar 28 (13.1%). But the person documenting these operative details were not identified in these operative notes.

Date of the surgery was mentioned in 82 %(n=138) of operative notes but only 9% (n=15) documented the time. Whether the operation was elective or emergency was mentioned in 5.3% (n=12). Name of the surgeon and assistant were noted in majority of the operative notes, but the name of the anaesthetist was mentioned in 8.3 % (n=18). Operative procedures and post-operative instructions were mentioned as shown in Figure 2 and 3 respectively.

Estimated blood loss was mentioned only in 2 operative notes out of 215. Only 7.1 %(n=15) were signed by the operating surgeon or assistant. .

Discussion

Operative notes are very important document after surgery and it should be written in detail for post-operative management purposes as well as legal purposes. Inadequacy has been noted in many centres including developed countries (1,3,6) which leads to poor post-operative patient

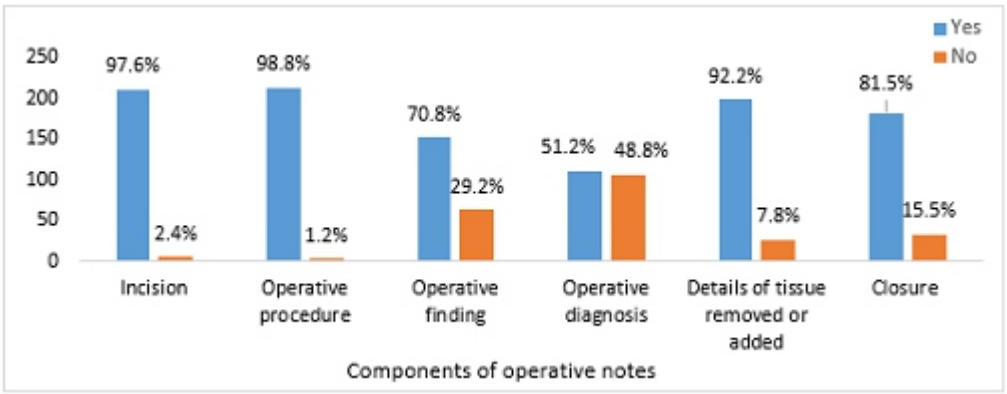

Figure 2. Documented components of operative procedure

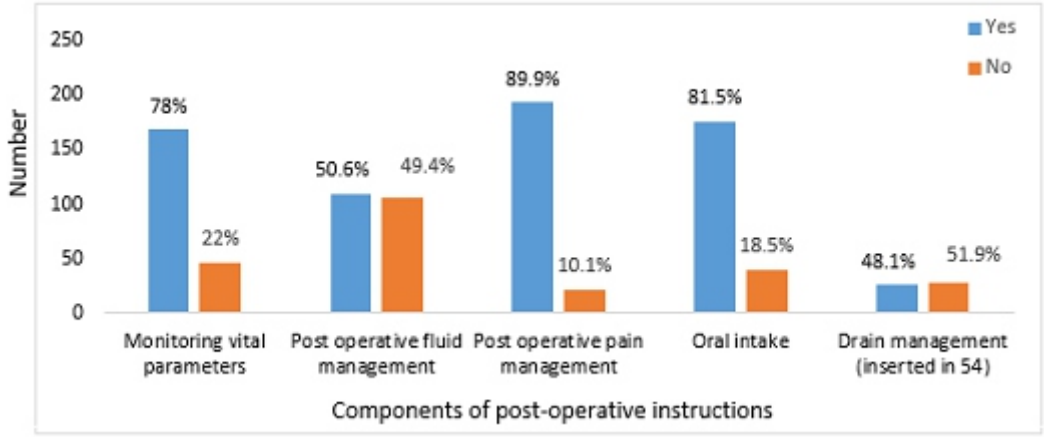

Figure 3. Documented components of post-operative instructions

management and follow up. Many centres have implemented different methods to overcome this issue (4,7).

In Sri Lanka most of the operative notes are hand written, which are shown to be deficient in some components and can lead to misinterpretations by other health care personal (8). Except for mentioning emergency or elective nature, name of the anesthetist , blood loss and signature of the note writer, other components were present in more than 50% of the operative notes. Mentioning emergency or elective is irrelevant in most of the major surgeries except exploratory laparotomies. Name of the anaesthetist is usually documented in anaesthetic notes. Blood loss is an important component which needs to be mentioned in OP notes for post-operative management plans. Signature by the consultant at the bottom of op note will make sure the proper information regarding surgery and post-operative management is conveyed to the BHT, which was missing in most. Our study is comparable to findings of other studies done in Asian and Europe countries, though there were some components missing.

There were some limitations in our study. We were unable to assess the quality of the details documented in each component, which needs more defined systems. Some European countries have implemented electronic format for documenting operative notes which reduced variability between different operation reports for the same procedure and increase their content in line with Royal College of surgeons of England recommend-ations. Most hospitals in the current local setting do not have computerised patient database systems making it difficult to implement electronic based operative note systems..

Conclusions and recommendation

Documenting operative notes need to improve further in some aspects. We can implement surgery specific pre-designed post-operative forms to be filled after the operations, which could be attached to the BHTs. There are some drawbacks such as, these pre- designed forms are surgery specific but not patient specific and also these can be lost easily from BHTs. After the implementation of such formats this study need to be re-audited to see improvement and sustainability.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. A K Ghosh, An audit of orthopedic operation notes: what are we missing? Clinical Audit 2010:2 37–40. doi.org/10.2147/CA.S9665
2. De Zoysa M.I.M, De zilva S.K.L.A, An audit on operative note writing, Annual Research Symposium Sept 2012, University of Colombo, Sri Lanka.
3. Hira Ali, Zubia Masood, Bushra Shirazi, Assessing the Quality of Operative Notes, Pak J Med Dent 2015; 4(1):54-59
4. Andrew W Barritt,Laura clark, Adam MM Cohen, Improving the quality of procedure-specific operation reports in orthopaedic surgery, Ann R Coll Surg Engl 2010; 92: 159–162. doi:10.1308/003588410X12518836439245
5. The Royal College of Surgeons of England. Good Surgical Practice. London, UK: RCSENG – Professional Standards and Regulation; 2014
6. Aamir A Hamza, Hulla M Abdalrahim, Saadeldin A Idris, Osama M Ahmed. Evaluating the Operative Notes of Patients Undergoing Surgery at Omdurman Teaching Hospital, Sudan. Sch. J. App. Med. Sci., 2013; 1(6):668-672
7. Kanthan Theivendran, Sami Hassan, David I Clark, Improving the quality of operative notes by implementing a new electronic template for upper limb surgery at the Royal Derby Hospital, BMJ Quality Improvement Reports 2016. doi:10.1136/bmjquality.u208727.w3498
8. Lefter LP, Walker SR, Dewhurst F, Turner RWL. An audit of operative notes: facts and ways to improve. ANZ J Surg 2008; 78: 800-802. doi: 10.1111/j.1445-2197.2008.04654.x.

BRIEF REPORT

Outcome of thigh arterio venous fistulae for haemodialysis in end stage renal failure

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Keywords: Thigh arterio venous fistula; haemodialysis; chronic kidney disease; lower extremity arterio venous fistula

Abstract

A well- functioning arterio venous fistula (AVF) is an essential need in patients with End Stage Renal Failure (ESRF). However, due to the lack of suitable veins and central venous stenosis, this may not be always possible in the upper limb. We present a case series of 10 such patients who underwent thigh arterio venous fistulae (TAVF). The initial success rate of such TAVF in this series is 71.4%. We believe that this is an acceptable result in this cohort of patients and also better than having a tunnelled line or a synthetic graft which can be associated with higher rates of infection.

Introduction

A well-functioning AVF is an essential need for haemodialysis in ESRF Patients. Majority of these patients are started on dialysis through temporarily inserted vascular catheters which are associated with many complications including central venous thrombosis and stenosis. It is best to have an upper extremity AVF due to higher long term patency rates and lesser morbidity and mortality (1). Certain complications like catheter related blood stream infection may result significant morbidity and at times death of the patient. However an upper extremity AVF may not be possible in many patients due to absence of suitable veins or presence of bilateral central venous stenosis. Available treatment options for such patients include angioplasty and/or stenting of central vein stenosis if these options are not possible.

A thigh Arterio Venous Fistula (TAVF) is the next option. A significant number of patients with multiple AVF failures and SVC obstructions due to previous dialysis line insertions present to our unit. Here we present a series of TAVF created in such patients.

Methods

This is a retrospective analysis of patients who underwent TAVF at the Teaching Hospital Anuradhapura between January 2015 and August 2017). Inclusion criteria were patients with failed upper limb AVFs due to SVC obstruction. These patients were not suitable for further upper limb fistulae due to the presence of SVC obstruction, causing severe arm and facial swelling. All patients had previously undergone fistulograms and failed attempt at SVC angioplasty. Patients were explained regarding the surgery and examined for peripheral arterial disease clinically. TAVF were constructed under spinal anaesthesia. Patients who were not fit for anaesthesia were excluded. Patients who were lost to follow up were also excluded.

In all selected patients AVF was created between the Superficial Femoral Artery (SFA) and Long Saphenous Vein (LSV). The LSV was mobilised from sapheno-femoral junction to lower thigh level and was tunnelled subcutaneously in a gentle curve orientation. Anastomosis was done to lower SFA using 6/0 polypropylene in an end to side manner. Cefuroxime 1.5g IV was used as perioperative prophylaxis (one dose at induction and two more doses post operatively). All patients were operated by a single surgeon. No post operatuve anticoagulation was given.

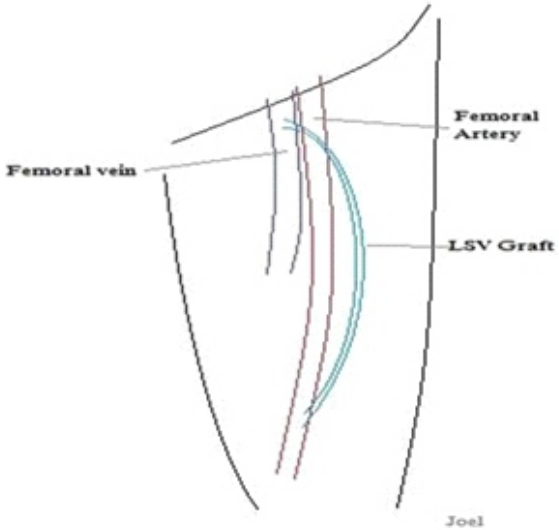

Figure 1. Illustration showing the configuration of the saphenous vein

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Table 01. Summary of patients who had TAVF surgery over a period of 32 months.

Patient No	Date of surgery	Age (years)	Sex	Surgery	Outcome
1	03/03/2015	27	M	Left Thigh AVF	Functional at 6 weeks.
2	07/04/2015	39	F	Right Thigh AVF	Functioning well after two weeks.
3	09/07/2015	35	M	Right Thigh AVF	Post-Operative Haematoma. Managed conservatively. Functional at 6 weeks.
4	26/11/2015	33	F	Left Thigh AVF	Functional at 6 weeks.
5	10/02/2016	50	F	Right Thigh AVF	Poor thrill at 6 weeks.
6	11/02/2016	46	M	Left Thigh AVF	Died during immediate post op. period due
7	06/06/2016	43	M	Left Thigh AVF	Functional at 6 weeks.
8	17/08/2017	42	F	Left Thigh AVF	Died during immediate Post op. period due to sepsis.
9	14/09/2017	38	F	Left Thigh AVF	Defaulted follow up.
10	23/11/2017	29	F	Left Thigh AVF	Functional at 6 weeks.

Results

A total of 10 patients underwent TAVF during this period. One patient was lost to follow up and the remaining 9 were included in the analysis. Two patients died during immediate post-operative period, one due to myocardial infarction and other due to sepsis as a result of surgical site infection. Among the 9 included, there were 4 males and 5 females. Mean age was 38.2 years. Fistula maturity was assessed clinically and 5 patients were able to dialyse using the TAVF at 6 weeks. Among the other two, one had TAVF thrombosis at 4 weeks and the other patient had poor thrill even after 6 weeks. Among the successful candidates, one had surgical site hematoma which was managed conservatively. However, at the end of study period (August 2017) there were only 3 patients who had functioning TAVF as two patients had died due to complications of chronic kidney disease. At our centre, the primary success rate of TAVF among patients who survived the initial post-operative period was 71.4% and the functional success rate in all patients is 55.6% (5/9) with a mortality of the procedure of 22%.

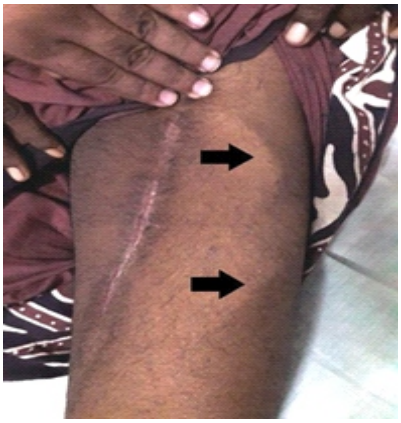

Figure 2. Mature thigh AVF used for dialysis

Conclusion and Discussion

Haemodialysis through upper limb AVF remains the commonest modality of renal replacement therapy in Sri Lanka (2). It is also the gold standard all over the world. However, failure of early evaluation for the need of AVF followed by repeated central venous catheterization results in the accumulation of a fair number of patients who have no viable venous access for AVF in the upper limbs. Peritoneal dialysis in our local regional setting is often impractical in most patients because of their poor home environment and lack of family support. In such patients, the next option would be a lower extremity AVF.

AV graft arm fistula (synthetic / thigh vein) also is not possible if it is definite central vein stenosis. Furthermore, considering the infection risk (3) and cost, it is better to offer autogenous lower extremity AVFs over synthetic graft AVFs as vascular access. The surgical technique used was looped Great saphenous vein-femoral artery fistula creation.

In our series, the primary success rate of TAVF was 71.4% among patients who survived the initial post-operative period. This is a desirable outcome and is better than tunnelled lines and synthetic grafts which are associated with higher rate of infection (1). Keeping the greater saphenous vein in a gentle curve position rather than loop orientation results in easier cannulation. However the factors like pain score, flow rate and cannulation difficulties were not assessed in this study which will be assessed in follow-up studies.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1 . Santoro D, Benedetto F, Mondello P, Spinelli F, Ricciardi C, Cernaro V et al. Vascular access for hemodialysis: current perspectives. 2018 doi:10.2147/IJNRD.S46643

2 . v2 CH1 Incidence, prevalence, patient characteristics, and treatment modalities [Internet]. Usrds.org. 2018 [cited 14 January 2018]. Available from: https://www.usrds.org/2013/view/v2_01.aspx

CASE REPORT

Diffuse oesophageal leiomyomatosis in a young female: presenting as a large posterior mediastinal mass

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Key words: Oesophageal leiomyomatosis, diffuse leiomyomatosis of the oesophagus.

Introduction

Diffuse oesophageal leiomyomatosis is a rare benign disorder of the oesophagus which is seen in children and young individuals. Oesophageal leiomyomas represents less than 0.6% of all oesophageal tumours. Symptomatic patients with dysphagia require surgical intervention with esophagectomy and creation of a Neo esophagus using gastric conduit (1,2).

Case report

23yr old female in 3rd trimester of her first pregnancy was investigated for shortness of breath for 1 month duration. Other than the constitutional symptoms of pregnancy she didn't have significant upper gastrointestinal symptoms. On chest radiography she was found to have a large opacity involving the left hemi thorax. She has undergone elective caesarean section and contrast enhanced computerized tomography scan of the chest and abdomen was done. It was revealed to be a mass at posterior mediastinum arising from the oesophagus. On orogastroduodenoscopy there were no mucosal lesions but external compression of the oesophageal lumen from 30cm up to38cm from the incisor tooth was noted. Gastro oesophageal junction (G.O.J) was at 38cm from incisor tooth and stomach was macroscopically normal. After routine pre-operative assessment and optimization she was planned for esophagectomy.

Left sided thoraco - laparotomy was done, after peritoneal survey oesophageal mobilization was done under direct vision with sharp and blunt dissection up to cervical part of the oesophagus. There was a large extra luminal mass arising from the wall of the oesophagus at G.O.J.

Stomach mobilization and duodenal kocherisation was done for the formation of the neo oesophageal conduit based on right gastroepiploic artery. Cervical part of the oesophagus was isolated and mobilized from the left side of the neck. Esophagectomy was done and proximal oesophageal end was biopsied and sent for frozen sectioning since there were submucosal nodules at upper end of the oesophageal cut end.

Oesophageal reconstruction was done with the stomach conduit and cervical anastomosis was performed. Naso jejunostomy tube was placed for enteral feeding and bilateral intercostal drains, abdominal drain and neck drains were placed. She had a protracted recovery at the intensive care unit complicated by elevated liver enzymes. On post-operative day 7 oral contrast study was performed which revealed intact cervical anastomosis without leakage. She was gradually established with oral feeding. Histopathology revealed diffuse oesophageal submucosal leiomyomatosis with large leiomyomata at lower end of the oesophagus.

Discussion and conclusion

Diffuse leiomyomatosis of the oesophagus is a rare entity with an unknown incidence seen in children and young adults which is characterized by multiple submucosal hamartomas within oesophageal wall. It is commonly seen in females with male to female ratio of 1:1.6 and commonly involves lower third of the oesophagus. It usually presents with upper

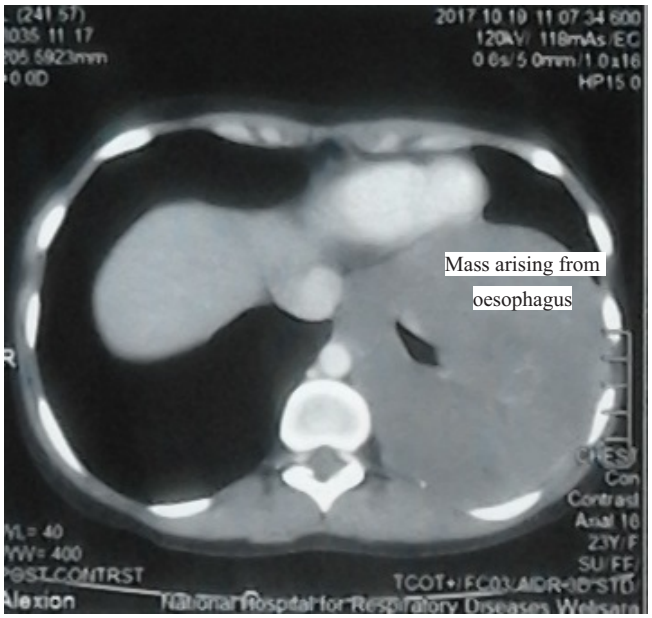

Figure 1. Contrast enhanced computed tomography (CECT) chest

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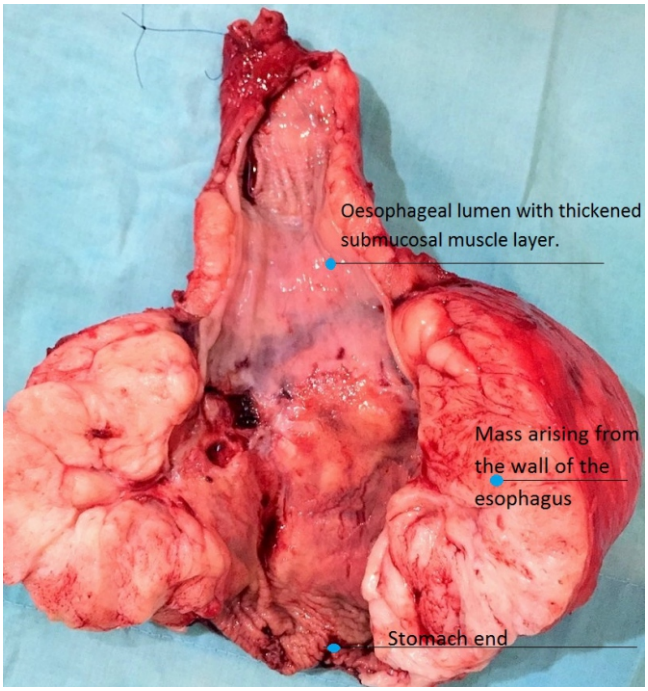

Figure 2. Esophagectomy specimen

gastrointestinal symptoms like dyspepsia, regurgitation and progressive dysphagia when it causes luminal compression.

It has a strong association with Alports syndrome and with leiomyomatosis of rest of the gastrointestinal tract and genitourinary tract (4). Histopathological analysis reveals smooth muscle proliferation with in the muscularis propria of the oesophagus results in multiple submucosal leiomyomata and they coalesce to form a large mass which occupies the posterior mediastinum with external compression of the oesophageal lumen.

Immunohistochemical analysis helps in differentiating the condition with gastro intestinal stromal tumours as it shows diffuse cytoplasmic immunoreactivity for smooth muscle actin (SMA) with no immnunoreactivity for CD117 and CD34 markers. In our case SMA was diffusely positive.

A symptomatic patient presents due to compression of the oesophageal lumen and may mimic oesophageal carcinoma or achalasia (3). Patients are incidentally diagnosed with routine chest X ray while on investigation for respiratory symptoms when it compresses lung parenchyma as a large mass occupying the posterior mediastinum as in our case.

Orogastroduodenoscopy, Barium swallow and contrast enhanced computerized tomography of the chest and abdomen are used to diagnose the condition.

Symptomatic patients with diffuse oesophageal involvement should undergo esophagectomy with neo oesophagus creation with a gastric conduit. When there is concomitant involvement of the stomach with leimyomata, colon or small bowel should be used for neo oesophagus creation. Due to the benign nature of the condition Patients who have undergone surgery has a good long term outcome. Young patients should be followed up in long term for renal, ocular and chochlea impairment to diagnose Alports syndrome in association with this condition. Genetic testing and counselling should be done in patients with a positive family history.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Lekawale H, Khandeparkar SS,Deshmukh S, Khadilkar A. A rare case of giant diffuse esophageal leiomyomatosis. Med J DY Patil Univ 2015;8:384-6. DOI: 10.4103/0975-2870.157095
2. Lee LS, Nance M, Kaiser LR, Kucharczuk JC.Familial massive leiomyoma with esophageal leiomyomatosis: an unusual presentation in a father and his 2 daughters. J Pediatr Surg. 2005 May;40(5):e29-32. DOI: 10.1016/j.jpedsurg.2005.02.016
3. Ray S, Saluja SS, Gupta R, Chattopadhyay TK. Esophageal leiomyomatosis – An unusual cause of pseudoachalasia. Can J Gastroenterol 2008;22:187-9. PMCID: PMC2659141
4. McKeeby JL, Li X, Zhuang Z, Vortmeyer AO, Huang S, Pirner M, Skarulis MC, James-Newton L, Marx SJ, Lubensky IA. Multiple leiomyomas of the esophagus, lung, and uterus in multiple endocrine neoplasia type . Am J Pathol.2001Sep;159(3):1121-7. doi: 10.1016/S0002-9440(10)61788-9.

Learning Points:

- Diffuse oesophageal leiomyomatosis is a rare benign disorder of the oesophagus which is seen in children and young individuals.
- It has a strong association with Alports syndrome and with leiomyomatosis of rest of the gastrointestinal tract and genitourinary tract.

CASE REPORT

Use of superior mesenteric vein for renal transplant venous outflow in a patient with extensive inferior vena cava thrombosis

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Key words: Renal transplantation; vena cava; mesenteric vein; thrombosis

Introduction

The routine vascular anastomosis in renal transplantation is performed to the recipient iliac vessels. In paediatric recipients (weight <15 kg) and certain re-transplants, venous and arterial anastomosis may be performed to the inferior vena cava (IVC) and aorta respectively (1,2). Therefore, when the common iliac veins (CIV) and IVC are both affected by systemic thrombosis, possible venous outflow channels for transplantation are limited and challenging. It may often result in significant delays or even being denied access to transplantation due to technical feasibility as well as potential thrombotic complications post-transplant.

Case report

S.N was a 28-year-old female in end stage renal failure (ESRF), with systemic lupus erythematosus and recurrent lower limb deep vein thrombosis since adolescence. She was on long-term anticoagulation (warfarin) since the age of 16 and on maintenance haemodialysis (right sided subclavian catheter) for 14 months. Her mother (47 years), came forward for live donation.

Assessment

Pre-operative duplex imaging of the patient showed an occluded left CIV. The right CIV though patent, showed monophasic flow with evidence of prior thrombotic disease and recanalization. Further imaging with magnetic resonance angiography confirmed extensive thrombosis of left CIV and infra-hepatic IVC (Figure 1, 2). There was extensive collateral formation along the left inferior epigastric, lumbar and retroperitoneal veins. The superior mesenteric vein (SMV) and portal vein were intact. Although the right CIV was patent, it appeared to be draining in to retroperitoneal collaterals. The upstream thrombus and complete occlusion of the IVC and monophasic flow within the right CIV were considered deterrents to successful graft implantation. The

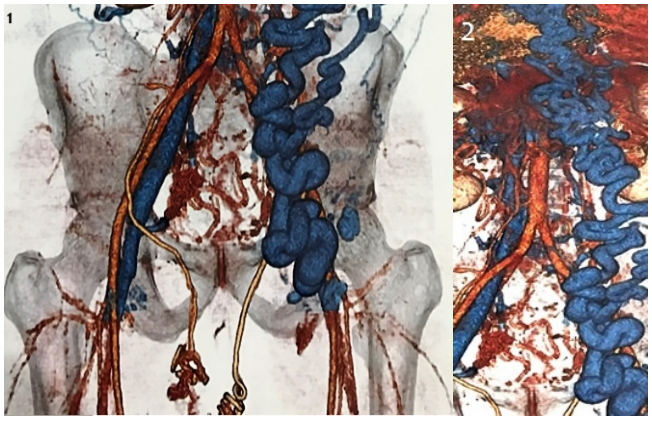

Figure 1. Magnetic Resonance Angiogram of the recipient
Figure 2. Extensive collateral formation around occluded iliac veins and vena cava

patent portal-mesenteric system was considered as a potential alternative. Detailed counselling was done for both the donor and recipient regarding the possible outcomes and long-term benefits of transplantation versus haemodialysis.

The donor renal angiogram showed two divergent arteries to left and a single artery to right kidney. Differential renal functions were; Left 53%, right 47%. The right kidney was selected for donation.

The recipient operation

Anticoagulation was changed from warfarin to enoxaparin, 4 days before surgery. The last dose of enoxaparin was given on the eve of surgery, while keeping the patient on graduated compression stockings throughout her hospital stay. A Midline laparotomy was done, and preliminary vascular assessment was performed. The IVC and aorta were exposed by medial rotation of the right colon; Cattell-Braasch manoeuvre. The IVC and left CIV were occluded with palpable hard thrombi and severe inflammation in the peri-venous tissue. The IVC thrombus extended beyond the confluence with native renal veins. The portal and superior mesenteric veins were patent and unaffected by thrombotic process. This was confirmed by intra-operative on-table duplex imaging.

A right laparoscopic donor nephrectomy was performed in conventional fashion. The retrieved kidney was cold perfused

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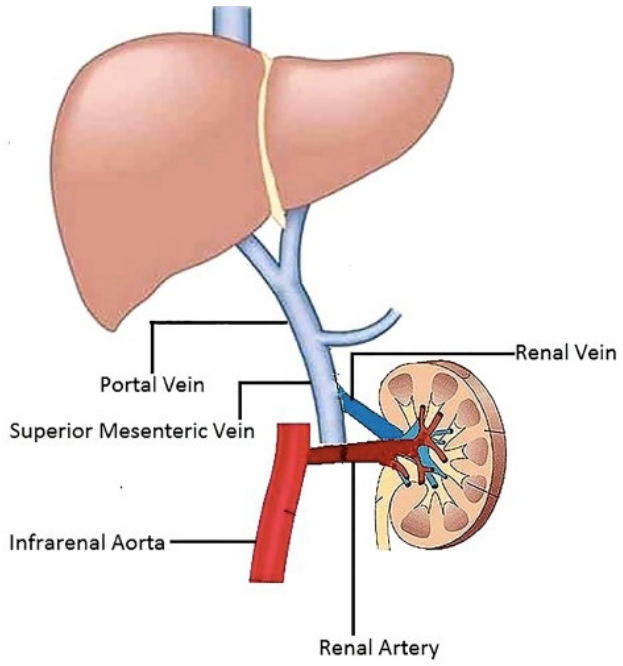

Figure 3. Schematic diagram of the vascular reconstruction

using histidine-tryptophan-ketogluterate solution in the back-table. The donor renal artery was short and was reconstructed with an extension venous graft (recipient right reversed great saphenous vein). The allograft vein was anastomosed to the proximal SMV (Figure 3); end-to-side configuration using 5/0 polypropylene. The reconstructed renal artery was anastomosed end-to-side to the aorta also with 5/0 polypropylene. The total warm ischaemia time was 21 minutes and cold ischaemia time was 34 minutes. Immediate reperfusion was done and showed excellent graft perfusion with minimal blood loss or systemic effects on the recipient. The ureter was anastomosed to the native right ureter (end-to-side), over a 5 French ureteric stent using 6/0 polydiaxone suture.

Peri-operative period

The immunosuppression was in keeping with that for a 'low-immunological risk' transplant, consisting of basiliximab induction, tacrolimus, mycophenolate mofetil and prednisolone. Prophylactic intravenous antibiotics were continued for 72 hours after surgery considering the extent of surgical dissection. The patient was extubated immediately after surgery and was managed in the intensive care isolation unit as for a standard transplant recipient. Oral feeding was restricted to liquids in the first 24 hours and solids were introduced from day-02. Subcutaneous enoxaparin 20 mg daily was continued from day-01.

The allograft showed immediate function with satisfactory diuresis, achieving normal serum creatinine levels by day-03. Warfarin was started at this time (day-03) and was continued along with enoxaparin until therapeutic levels were achieved (day-07). At this time, enoxaparin was discontinued, and warfarin was continued at the same dose. Duplex imaging (day-01, day-04), showed excellent graft perfusion and venous drainage. She was discharged on day-08 with normal graft function (serum creatinine 1.1 mg/dl).

Post-operative care

Initial post-operative visits showed sustained graft function (serum creatinine 0.9-1.1 mg/dl). On day-27, she was admitted with elevated serum creatinine, 1.9 mg/dl. Duplex scan showed high arterial resistive indices (0.87-0.89) with normal venous drainage. The blood tacrolimus level was 9.3 ng/ml. A biopsy was not performed due to on-going anticoagulation and was treated empirically with Methyl-Prednisolone Pulsing. Graft function returned to normal with treatment and has been sustained since. Presently (15 months post-operative), she maintains satisfactory graft function (Serum creatinine 1.2 mg/dl) and remains in good health.

Discussion

In the absence of patent iliac veins for allograft venous drainage, the alternatives are infra or supra hepatic IVC, native renal veins after native nephrectomy or mesentero-portal veins (3,4). Successful implantation to the portal vein, SMV and splenic vein in paediatric recipients with deceased donor grafts has been reported with reasonable success in small numbers (5).

We did not use the right CIV due to the extensive upstream thrombosis in the IVC and monophasic flow on duplex. Extension of the IVC thrombus beyond the confluence with renal veins precluded implantation in to the native renal veins. The short length of the right donor renal vein did not allow us to reach the portal vein, while using the aorta for arterial anastomosis. The inferior mesenteric vein although patent, appeared too delicate, thin walled and small. Hence it was decided to use the larger SMV as the venous outflow. Post-operative clinical and duplex surveillance did not show any impact on graft function, native liver function or portal venous flow.

Conclusion

Renal transplantation offers the best outcomes for patients in ESRF. Thrombosis of IVC and CIV should not be considered contra-indications to renal transplantation thereby denying such patients the chance for a transplant. While maintaining therapeutic anticoagulation to prevent recurrent thrombosis, alternate venous drainage routes such as the portal-mesenteric system should be explored where feasible. Although deceased donor transplants allow extra length of graft vessels to perform complex vascular reconstruction, live donor transplants are limited by the short length of graft artery and vein. Nevertheless, with meticulous planning and care, live donor transplants can also be performed for the selected individual patients. Available short-term results have shown encouraging outcomes with excellent graft function.

Explicit informed written consent has been obtained from the patient regarding the academic publication of this article with relevant details.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Watson CJE, Friend PJ. Chapter - 11 Surgical Techniques of Kidney Transplantation. In: Morris P, Knechtle SJ, editors. Kidney Transplantation–Principles and Practice. 2014. page 161–75.
2. Adams J, Gudemann C, Tonshoff B, Mehls O, Wiesel M. Renal transplantation in small children--a comparison between surgical procedures. Eur. Urol. 2001;40:552–6.
   https://doi.org/10.1159/000049835
3. Pirenne J, Benedetti E, Kashtan CE, Llédo-Garcia E, Hakim N, Schroeder CH, et al. Kidney transplantation in the absence of the infrarenal vena cava. Transplantation 1995;59:1739–42.
   https://doi.org/10.1097/00007890-199506270-00018
4. Aguirrezabalaga J, Novas S, Veiga F, Chantada V, Rey I, Gonzalez M, et al. Renal transplantation with venous drainage through the superior mesenteric vein in cases of thrombosis of the inferior vena cava. Transplantation 2002;74:413–5.
   https://doi.org/10.1097/00007890-200208150-00022
5. Millan M, Caicedo LA, Villegas JI, Serrano O, Caicedo L, Duque M, et al. Case report of cadaveric kidney transplantation with renal-portal venous drainage: A feasible way for a venous drainage in a complex generalized thrombosed vessels setting. Int. J. Surg. Case Rep. 2016;28:192–5.
   https://doi.org/10.1016/j.ijscr.2016.09.047

Learning Points:

- IVC thrombosis and thrombophilias are not a contra-indication for renal transplantation
- The portal-mesenteric venous system is often spared in systemic thrombotic disease
- Successful transplantation can be done using the portal-mesenteric system with full anti-coagulation.

CASE REPORT

A painful neck lump: unusual presentation of prostate carcinoma

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Keywords: Carcinoma of prostate; skeletal metastasis; PSA; bone scan

Introduction

Prostate carcinoma (PCa) is the second most common cancer in Sri Lankan males aged above 65 year (1). Though PCa is usually identified incidentally yet it can present with lower urinary tract symptoms, haematuria or back pain. The common sites of PCa metastasis are bones and regional lymph nodes but it can also spread to lung, liver and brain. We present a case of PCa presenting with a painful neck lump.

Case report

75 year old male patient presented with painful lump over right lower neck for one year (Fig.1). This lump was progressively increasing in size. It has been painful for the last two months. On direct questioning, he was found to have lower urinary tract symptoms for last 6 months. These symptoms were also increasing progressively. He had one episode of haematuria two months back which resolved spontaneously. He lost 5kg weight recently but he had good appetite. He had regular bowel habit. In the past he did not have diabetes or contact history of tuberculosis.

On examination he was emaciated with BMI of 17kg/m2. There were no cervical, axillary or inguinal lymphadenopathy. The lump was lying over the right sterno - clavicular joint. It was firm and tender. It was not pulsatile but was slightly warm. He had a scaphoid abdomen with no intra abdominal masses. Digital rectal examination revealed an irregularly enlarged prostate which was hard in consistency with absent medial groove.

His Chest X-ray (Fig – 2A) showed a hyper dense area over medial end of clavicle. Ultrasound scan revealed as soft tissue lesion which was continues with clavicle and there was no cervical lymphadenopathy. His thyroid was normal. His abdominal ultrasound scan revealed thickened bladder wall with enlarged prostate (200ml) with heterogeneous

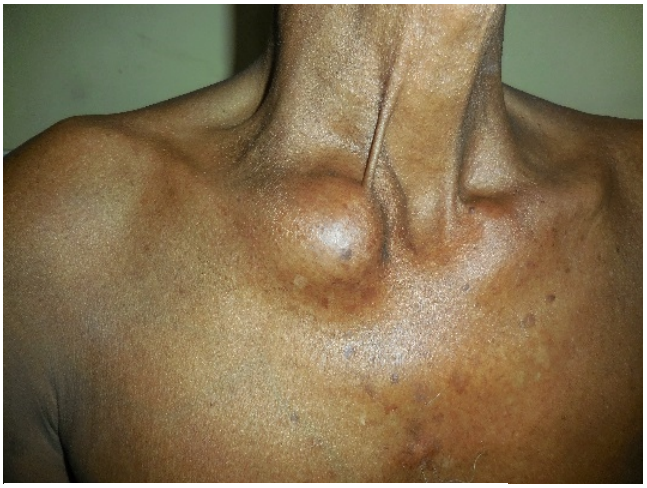

Figure 1. Lump over medial end of right clavicle

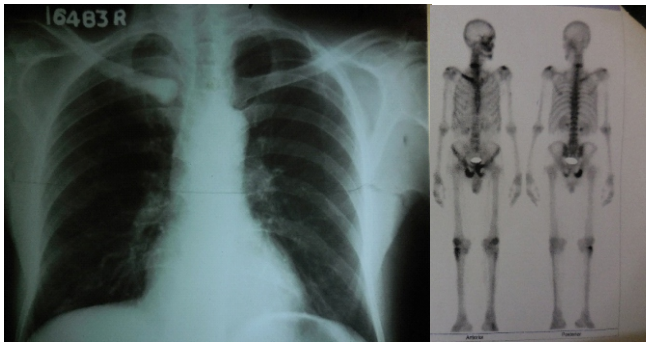

Figure 2. A- Increased radio opacity of medial end of right clavicle. B - 99m Tc MDP bone scan. He also had multiple skeletal metastases over left pubic bone and right inferior pubic ramus.

echogenicity. He had residual urine of 150ml without upper urinary tract dilatation. PSA was more than 100ng/ml. His renal function tests were within normal limits.

He underwent a trans-rectal biopsy of prostate. Biopsy revealed as prostatic acinar adenocarcinoma with a Gleason score of 4+4 = 8. There was no perineural or vascular invasion. 99m Tc MDP bone scan (Fig-2B) revealed that increased tracer uptake in right clavicle.

He underwent a sub-capsular orchiectomy. After one month of surgery we found reduction in the size of neck lump and improvement in lower urinary tract symptoms. Currently he is followed up at the oncology clinic.

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Discussion

Prostate adenocarcinoma is common in men over the age of 65 years and it is the second most common malignancy in men globally (2). It usually arises from the peripheral zone of the prostate whereas the benign prostatic hyperplasia from the transitional zone. Most prostate adenocarcinomas are slow growing tumours, Prostate adenocarcinomas are asymptomatic in most and identified incidentally or in autopsy specimens. It can present with symptoms of bladder outflow obstruction and bone metastasis, but atypical presentations also noted such as brain, breast metastasis and generalised lymphadenopathy.

On digital rectal examination PCa feels hard with irregular surface and absence of median groove. Rectal mucosa becomes immobile if PCa involves rectal wall, but it is rare.

The metastasis from PCa is usually osteoblastic (sclerotic). This is because of formation of bone close to metastatic site (3). In our patient chest X-ray showed enlarged medial end of right clavicle with increased bony density which reveals sclerotic metastasis to right clavicle.

Of course it is also possible to have osteolytic bone metastasis with PCa (3).

The prostate biopsy of this patient revealed acinar adenocarcinoma which is the commonest type of PCa. Very rarely there may be other variants like ductal adenocarcinoma which is associated with higher clinicopathological staging and poor prognosis.

PSA is prostate specific but not PCa specific. Elevated levels of PSA could be observed in conditions other than PCa such as bacterial prostatitis, acute urinary retention, following prostate biopsy etc. PSA levels in the range of 2.5 – 10 ng/ml imparts problem in diagnosing PCa. In these situations modifications of PSA measurements such as PSA density, PSA velocity & Free versus total PSA are utilised to predict the possibility of PCa. In the above patient the PSA was >100ng/dl which was clearly pointing to the possibility of metastatic PCa.

In the presence of biopsy proven PCa with elevated levels of PSA, the investigation of choice for staging the disease is bone scan. Technetium 99m-methyl diphosphonate (99mTc MDP) is a radioisotope used for bone scans. Technetium uptake was increased at right medial end of clavicle confirming the metastasis. Also hotspots seen in left pubic bone and right inferior pubic ramus. Rarely a photopaenic defect (cold spot) may be visible in bone scans.

CT or MRI scans are useful to assess the local spread of PCa and the state of regional (pelvic) lymphnodes. Staging with CT/MRI imaging is mandatory before embarking on radical surgical interventions for PCa.

The aim of treatment of a patient with metastatic PCa is to control the disease by androgen blockade. Bilateral orchidectomy abolishes the testosterone coming from testis. Anti-antrogen drugs, such as flutamide, are competitive blockers at receptor level. The total androgen block by LHRH agonist is expensive and also risks a flare-up worsening effect in the first 14 days of use (5). The PSA level dropped to 3.5ng/dl after orchidectomy. He is being followed up at the oncology clinic with regular PSA assessment.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. National Cancer Control Programme. Government cancer Institute. Cancer Incidence Data: Sri Lanka Year 2010 – Cancer Registry, 6th edn. Colombo, Sri Lanka available at http://www.nccp.health.gov.lk/images/PDF_PUBLICATIONS/Cancer_Incidence_Data_2010.pdf
2. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. CA: a cancer journal for clinicians. 2011 Mar 1;61(2):69-90. doi: 10.3322/caac.20107
3. Suva LJ, Washam C, Nicholas RW, Griffin RJ. Bone metastasis: mechanisms and therapeutic opportunities. Nature Reviews Endocrinology. 2011 Apr 1;7(4):208-18. doi: 10.1038/nrendo.2010.227
4. Adhyam M, Gupta AK. A review on the clinical utility of PSA in cancer prostate. Indian journal of surgical oncology. 2012 Jun 1;3(2):120-9. doi: https://doi.org/10.1007/s13193-012-0142-6
5. Gittes RF. Carcinoma of the prostate. New England Journal of Medicine. 1991 Jan 24;324(4):236-45.doi: 10.1056/NEJM199101243240406

Learning Points:

- Prostate carcinoma will have to be considered in the differential diagnosis of elderly men presenting with painful neck lump especially over bony parts.
- The DRE should not be ignored in any elderly man, regardless of the presenting symptoms.

CASE REPORT

Metastatic anaplastic large cell lymphoma (ALCL) presenting with small bowel perforation

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Keywords: ALCL; small bowel perforation; lymphoma

Introduction

Lymphoma ranks third in the incidence of small bowel malignancy, with adenocarcinoma being the commonest (1). Anaplastic large cell lymphoma (ALCL) constitutes about two percent of adult non-Hodgkin lymphoma and is a subset of T cell lymphoma histology. It has a bimodal age distribution with regard to incidence with the first peak in adolescence and the second after the sixth decade , with a male predominance. Four cases of primary small bowel ALCL presenting with perforation have previously been reported (1). However, literature regarding metastatic ALCL to the small bowel presenting with perforation is scarce. We report a case of metastatic ALCL which presented as jejunal perforation.

Case report

A 65 year old Malay gentleman presented with fever and sudden onset of abdominal pain, most pronounced over the epigastrium for two days. He had a history of ALK negative anaplastic large cell lymphoma, which was diagnosed 5 months prior to the presentation. He had completed two cycles of chemotherapy with Cyclophosphamide, Doxorubicin, Vincristine and Prednisolone (CHOP). He was later switched to Chlorambucil + Prednisolone due to intolerance. He also suffered from diabetes mellitus and hypertension. Examination revealed tenderness over the epigastric region with peritonism. Computed Tomography (CT) of the abdomen showed fluid in perihepatic, subhepatic and pelvic regions with air pockets within. Patient underwent an emergency laparotomy with a provisional diagnosis of a perforated viscous. Intra operatively, he was found to have a jejunal perforation, approximately 25 cm from duodeno-jejunal flexure with an ulcerative lesion within. There were multiple enlarged mesenteric lymph nodes, largest measuring 3x3 cm. Peritoneal cavity was grossly contaminated with succus entericus. A wedge resection with primary anastomosis and peritoneal lavage was done. Perioperative dissection showed an ulcerative lesion, occupying about 60% of the jejunal lumen. Patient was in intensive care for 48 hours post-opperatively with respiratory support. He had an uneventful perioperative recovery and was discharged home on postoperative Day 9.

Histopathological examination revealed ulcerative exudate surrounded by neoplastic lymphoid infiltrates. Hallmark cells were also seen; hence the interpretation of ALCL (ALK negative) of small bowel with clear proximal and distal

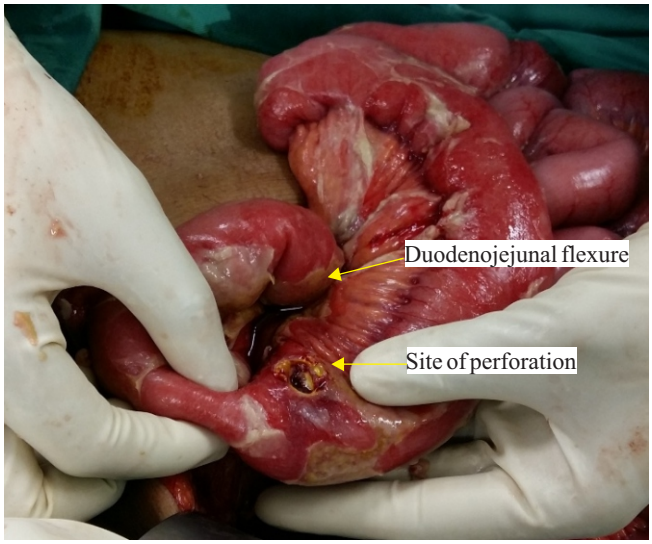

Figure 1. Intraoperative image showing the site of perforation at the mesenteric border of proximal jejunum

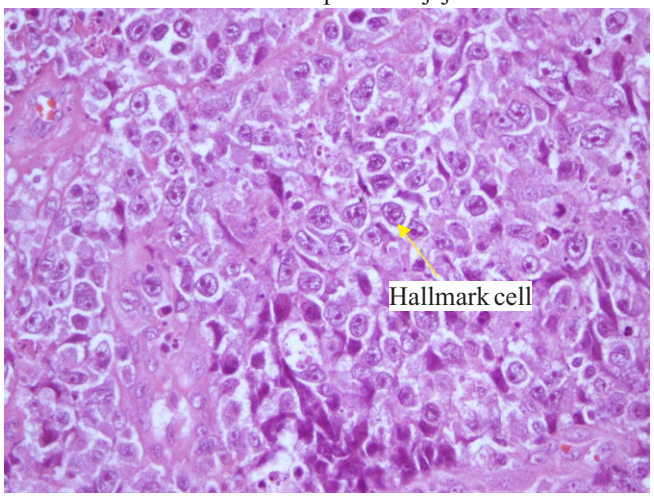

Figure 2. Hemotoxylin and eosin staining showing hallmark cells

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margins was made. Unfortunately he passed away 2 weeks later due to respiratory failure.

Discussion

ALCL belongs to a rare group of peripheral T cell lymphoma with 4 distinct forms, namely primary systemic ALK+, primary systemic ALK-, breast implant associated and primary cutaneous ALCL.

The diagnosis is established by histopathological examination where the 'hallmark cell' is pathognomonic. It has an eccentric nucleus, and a prominent, pale Golgi region or a paranuclear hof. Systemic ALCL can further be sub classified according to the presence or absence of ALK (anaplastic lymphoma kinase), which has an impact on the prognosis.

This report highlights a rare occurrence of a metastatic perforation secondary to ALCL, the pathogenesis of this complication and the choice of management.

Presence of gastrointestinal disease plays a huge impact in the course and outcome of lymphoma(1).Bowel perforation manifests in advanced stage of the disease. Small bowel is the commonest region to perforate owing to its relatively thinner wall. In this case, the perforation occurred in the jejunum.

The pathogenesis of bowel perforation secondary to metastatic carcinoma is consequent to spread of the malignant cells to the intramural portion of the bowel. When the cells become non-viable, perforation takes place, whereas if they remain viable and grow into the lumen, obstruction occurs (2).The use of chemotherapy and steroids accelerates the process of tumour necrosis with the intestine (3). Even though systemic chemotherapy along with steroids had been administered to this patient, the histopathology revealed ulceration rather than tumour necrosis. Hence, the probable pathogenesis of the bowel perforation in this case is infiltration of lymphoma cells into the bowel wall through the lymphatics. Subsequently, mucosal ulceration ensued, slowly increasing in depth combined with increased intraluminal pressure leading to focal rupture of bowel.

Although emergency surgery for bowel perforation secondary to metastatic lymphoma is inevitable, the outcome is generally dismal, as gastrointestinal perforation secondary to metastasis from extra-abdominal primary is regarded as a terminal event in the course of the disease. Majority of the patients succumb to the illness within 6 months of the bowel perforation. There is only one report citing a patient who survived up to 5 years post bowel resection for a metastatic lymphoma (4) .

Keeping this in mind, the best operative course for patients with bowel perforation resulting from a metastatic tumor, would be a resection of devitalised bowel along with the metastatic lesion, and fashioning of an end stoma with a mucus fistula (5). This would eliminate the possibility of anastomotic leak and the complications associated with it, aiming to provide the patient with an acceptable quality of life. We adhered to this principle in our case with the exception of stoma, due to the proximal location of the perforation.

Conclusion

Small bowel perforation secondary to metastatic malignant lymphoma is a rare phenomenon. However, it is prudent to consider this differential when we approach a patient with spontaneous perforation of the hollow viscous. Due to the poor survival associated with this condition, the surgical management should be one that subjects the patients to the least amount of stress which would promote a faster perioperative recovery and in turn, a better quality of life.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Ara C., Coban S, Kayaalp C. et al. Spontaneous Intestinal Perforation Due to Non-Hodgkin's Lymphoma: Evaluation of Eight Cases. *Dig Dis Sci* 2007; 52: 1752-56 doi: 10.1007/s10620-006-9279-x
2. Leidich RB, Rudolf LE. Small bowel perforation secondary to metastatic lung carcinoma. *Ann Surg* 1981 Jan;193:67–69 PMCID: PMC1345004
3. Wada M, Onda M, Tokunaga A, Kiyama T et al. Spontaneous gastrointestinal perforation in patients with lymphoma receiving chemotherapy and steroids. J Nippon Med Sch 1999;66:37–40 PMID: 10097589
4. Ise N, Kotanagi H, Morii M, Yasui Oet al.Small bowel perforation caused by metastasis from an extra-abdominal malignancy: report of three cases.Surg Today. 2001;31(4):358-62. doi: 10.1007/s005950170161
5. Shiraishi M, Hirayasu S, Nosato E, Shimoji H et al.Perforation due to metastatic tumors of the ileocecal region.World J Surg 1998; 22:1065–68. PMID: 9747168

Learning Points:

- To consider spontaneous hollow viscous perforation as a differential in a patient who presents with acute peritonitis
- In the surgical management of a patient with metastatic small bowel perforation secondary to lymphoma, to perform a procedure that subjects the patient to the least surgical stress, individually tailored according to location of perforation and extent of peritoneal contamination

SELECTED ABSTRACTS

Low intensity pulsed ultrasound for bone healing
Systematic review of literature

Schandelmaier S, Kaushal A, Lytvyn L, et al.
BMJ 2017 ;356:l656
http;//dx.doi.org./10.1136/bmj.656

Question

Does low intensity pulsed ultrasound (LIPUS) improve bone healing?

Methods

Systematic review and meta analysis of randomised control trials comparing LIPUS with sham device or no device was compared with patients with fracture or osteotomy. All medical databases and trial registries compared until November 2016. Two reviewers identified the studies and BMJ parallel guidelines committee advised the design and interpretation of the review GRADE used to assess quality of evidence

The results and limitations:

26 randomised control trials with median sample size of 30 (Range 8-501) were included. Compared with control LIPUS did not reduce time to return to work or the number of subsequent operations.Effects for the outcomes of full weight bearing, pain, and days to radiographic healing varied substantially between studies.Main evidence applied directly to fresh fractures. The applicability of other types of fracture or osteotomy is opened to debate

Conclusion

Based on moderate to high quality evidence mainly from studies in patients with fresh fracture LIPUS does not improve outcomes patients and fresh with fresh fracture has no effect on radiographic bone healing.

Commentary

Hiran Amarasekera
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Neville Fernando Teaching Hospital
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In modern society with high energy injuries and extreme sports injuries complex fracture patterns are common. In sportsman it seem too long once fracture is fixed to await a natural healing cycle as demand to return to sport quickly is high. Therefore various treatment modalities have been tried to enhance fracture healing and LIPUS (Low Intensity Pulsed Ultrasound) has been performed as one of the modalities. But does it really work? If so what is the evidence?

To answer the question Schandelmaier S, Kaushal A, Lytvyn L, et al performed a systematic review of literature as many articles have been published in this topic recently. After analysing over 26 randomised control trials the authors found no evidence of any significant benefit of LIPUS versus control mainly over treatment of fresh fractures.

Since this article was published over a year ago a modified search update was done by the commentator with a limited Google search and did not find any new evidence to show otherwise. It seems that we have found an answer to the question Does LIPUS improve bone healing? The answer appears to be “No” it doesn't.

TA randomized controlled trial comparing autologous cranioplasty with custom-made titanium cranioplasty

S Honeybul, D A Morrison, K M Ho, C R P Lind and E Geelhoed Journal Of Neurosurgery
Apr 2018/Vol. 128/No. Suppl1/pages 81-90

Objective

Autologous bone is usually used to reconstruct skull defects following decompressive surgery. However, it is associated with a high failure rate due to infection and resorption. The aim of this study was to see whether it would be cost-effective to use titanium as a primary reconstructive material.

Methods

Sixty-four patients were enrolled and randomized to receive either their own bone or a primary titanium cranioplasty. All surgical procedures were performed by the senior surgeon. Primary and secondary outcome measures were assessed at 1 year after cranioplasty.

Results

There were no primary infections in either arm of the trial. There was one secondary infection of a titanium cranioplasty that had replaced a resorbed autologous cranioplasty. In the titanium group, no patient was considered to have partial or complete cranioplasty failure at 12 months of follow-up ($p = 0.002$) and none needed revision ($p = 0.053$). There were 2 deaths unrelated to the cranioplasty, one in each arm of the trial. Among the 31 patients who had an autologous

cranioplasty, 7 patients (22%) had complete resorption of the autologous bone such that it was deemed a complete failure. Partial or complete autologous bone resorption appeared to be more common among young patients than older patients (32 vs 45 years old, p = 0.013). The total cumulative cost between the 2 groups was not significantly different (mean difference A$3281, 95% CI $-9869 to $3308; p = 0.327).

Conclusions

Primary titanium cranioplasty should be seriously considered for young patients who require reconstruction of the skull vault following decompressive craniectomy.

Commentary

Dr. Ruvini Abeygunaratne
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Hope Hospital, Manchester,
Lanka hospitals, Colombo, Sri Lanka.

This is an important study especially in its relevance to developing countries where resources and funding for Titanium cranioplasties is scarce. The traditional method of storing the removed bone in the patient subcutaneous fat in the abdomen maybe making a comeback as it appears that there isant a significant increase in the infection rate and failure comparing the two. But it is highlighted that as the resorption rate is 22% which is a significant factor that needs to be taken into consideration and therefore a titanium cranioplasty should be seriously considered the first line for younger patients. As the storage facilities have improved we are now able to preserve autologous bone grafts for a longer period of time.

Characterization and Optimal Management of High-risk Pancreatic Anastomoses During Pancreatoduodenectomy

Ecker, Brett, L., MD; McMillan, Matthew, T., BA; Asbun, Horacio et al.

Annals of Surgery: –April 2018 - Volume 267 - Issue 4 -
p 608616
doi: 10.1097/SLA.0000000000002327

Objective

The aim of this study was to identify the optimal fistula mitigation strategy following pancreaticoduodenectomy.

Background

The utility of technical strategies to prevent clinically relevant postoperative pancreatic fistula (CR-POPF) following pancreatoduodenectomy (PD) may vary by the circumstances of the anastomosis. The Fistula Risk Score (FRS) identifies a distinct high-risk cohort (FRS 7 to 10) that demonstrates substantially worse clinical outcomes. The value of various fistula mitigation strategies in these particular high-stakes cases has not been previously explored.

Methods

This multinational study included 5323 PDs performed by 62 surgeons at 17 institutions. Mitigation strategies, including both technique related (ie, pancreatogastrostomy reconstruction; dunking; tissue patches) and the use of adjuvant strategies (ie, intraperitoneal drains; anastomotic stents; prophylactic octreotide; tissue sealants), were evaluated using multivariable regression analysis and propensity score matching.

Results

A total of 522 (9.8%) PDs met high-risk FRS criteria, with an observed CR-POPF rate of 29.1%. Pancreatogastrostomy, prophylactic octreotide, and omission of externalized stents were each associated with an increased rate of CR-POPF (all P < 0.001). In a multivariable model accounting for patient, surgeon, and institutional characteristics, the use of external stents [odds ratio (OR) 0.45, 95% confidence interval (95% CI) 0.25–0.81] and the omission of prophylactic octreotide (OR 0.49, 95% CI 0.30–0.78) were independently associated with decreased CR-POPF occurrence. In the propensity score matched cohort, an "optimal" mitigation strategy (ie, externalized stent and no prophylactic octreotide) was associated with a reduced rate of CR-POPF(13.2% vs 33.5%, P < 0.001).

Conclusions

The scenarios identified by the high-risk FRS zone represent challenging anastomoses associated with markedly elevated rates of fistula. Externalized stents and omission of prophylactic octreotide, in the setting of intraperitoneal drainage and pancreaticojejunostomy reconstruction, provides optimal outcomes.

Commentary

Dr S Sivaganesh MS FRCS PhD
Senior Lecturer & Honorary Consultant Surgeon
Department of Surgery
University of Colombo, Sri Lanka

This feature aims to address optimal care of those patients at high risk of clinically relevant postoperative pancreatic fistulae (CR-POPF), the proverbial Achilles heel of the Whipple procedure. It uses the Fistula Risk Score (FRS), a ten point validated score predicting risk of developing ISGPF (grades B/C) CR-POPF following pancreatoduodenectomy. The FRS further validates previous literature on risk factors

for pancreatic anastomotic leaks including a soft gland and narrow duct.

The almost 1/3 CR-POPF rates indicated in this study, even for this high risk cohort, is high compared to rates observed in local tertiary HPB centres. Interestingly, this study appears to indicate that conventional measures used to mitigate a CR-POPF in high risk patients, such as the administration of octreotide may in fact paradoxically have a detrimental effect. It also recommends that the use of externalised stents to reduce leak rates in this subset of patients. This certainly adds new information on the management of this challenging group of patients but warrants further investigation.

Hand Infections

John C. Koshy, Bryce Bell
DOI: https://doi.org/10.1016/j.jhsa.2018.05.027
Publication stage: In Press Corrected Proof
Published online: July 15, 2018

Abstract

Infections are common in hand surgery and proper management is important to achieve optimal outcomes. Although most cases are not urgent, less common, severe infections such as flexor tenosynovitis and necrotizing fasciitis require urgent identification with both medical and surgical management. It is common for diagnoses to be missed or delayed because clinical and laboratory indicators are often variably present. Delayed identification and management can result in poor outcomes with permanent deficits. This article will provide a review of hand infections with a focus on identifying serious hand infections requiring urgent or emergent treatment, and distinguishing these from less urgent scenarios.

Commentary

Dr. Gayan Ekanayake
Plastic and Reconstructive Unit
Teaching Hospital, Kurunegala, Sri Lanka.

Hand infections in Sri Lanka largely goes unnoticed. This article in the journal of hand surgery gives guidance how to identify and select the cases that needs urgent care. Serious infections can be identified with clinical and laboratory indicators. However, interpretation of these findings needs critical evaluation to provide appropriate weightage.

Tenosynovitis is one of the common deep infections that need urgent decompression and irrigation to prevent loss of flexor tendons. Similar can be told about necrotizing fasciitis which generally ascends along fascial planes. The latter can lead to devastating consequences to future hand function

Although there no single laboratory test capable of detecting hand infection using a combination of tests can lead to better clinical prediction of the need to intervene early.

Erratum

Abstract (Poster) No. 56- Retrospective histopathological analysis of thyroidectomy: a single unit experience

Sri Lanka Journal of Surgery 2018; 36, Issue Supplement S1: 47

The authors' names should be corrected as:

Dr. S K V Gunasekare, Dr. W S Rathnaweera, Dr. K B Galketiya, Dr. H M R S B Kotakadeniya, Dr. A K B B T B Samarasinghe, Dr. S P M Peiris, Dr. E M U J B Ekanayake, Dr. S Hadiwattage, Dr. A S Samarasinghe

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