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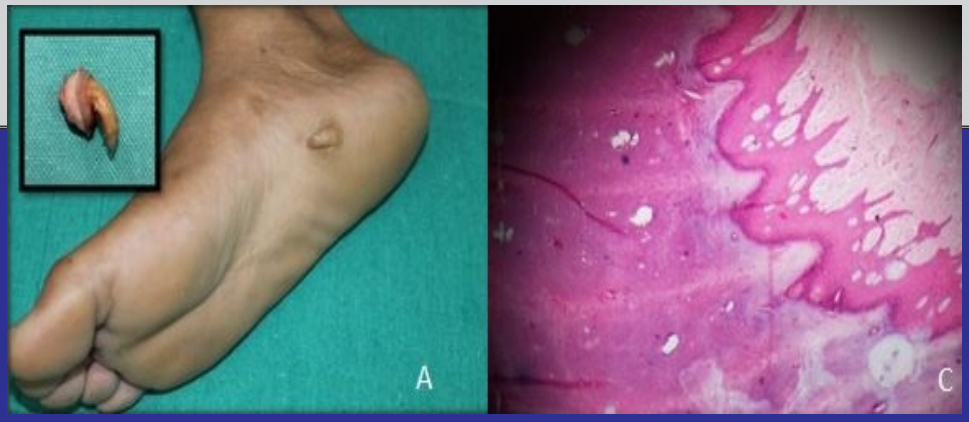

In this issue

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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.

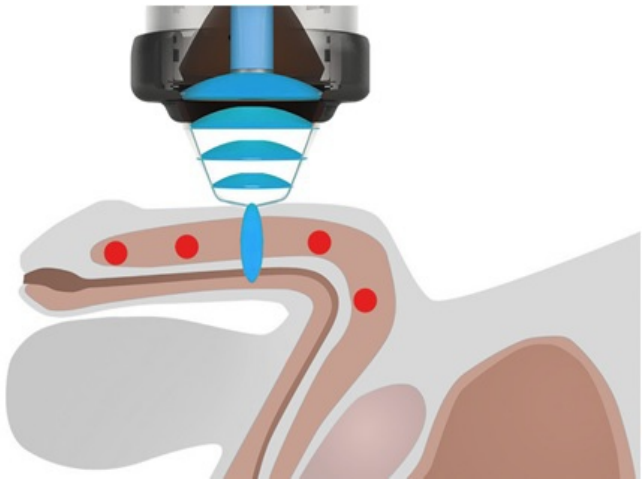

Figure 1. Shock wave therapy

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
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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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Erectile Dysfunction Shockwave Therapy (SWT)

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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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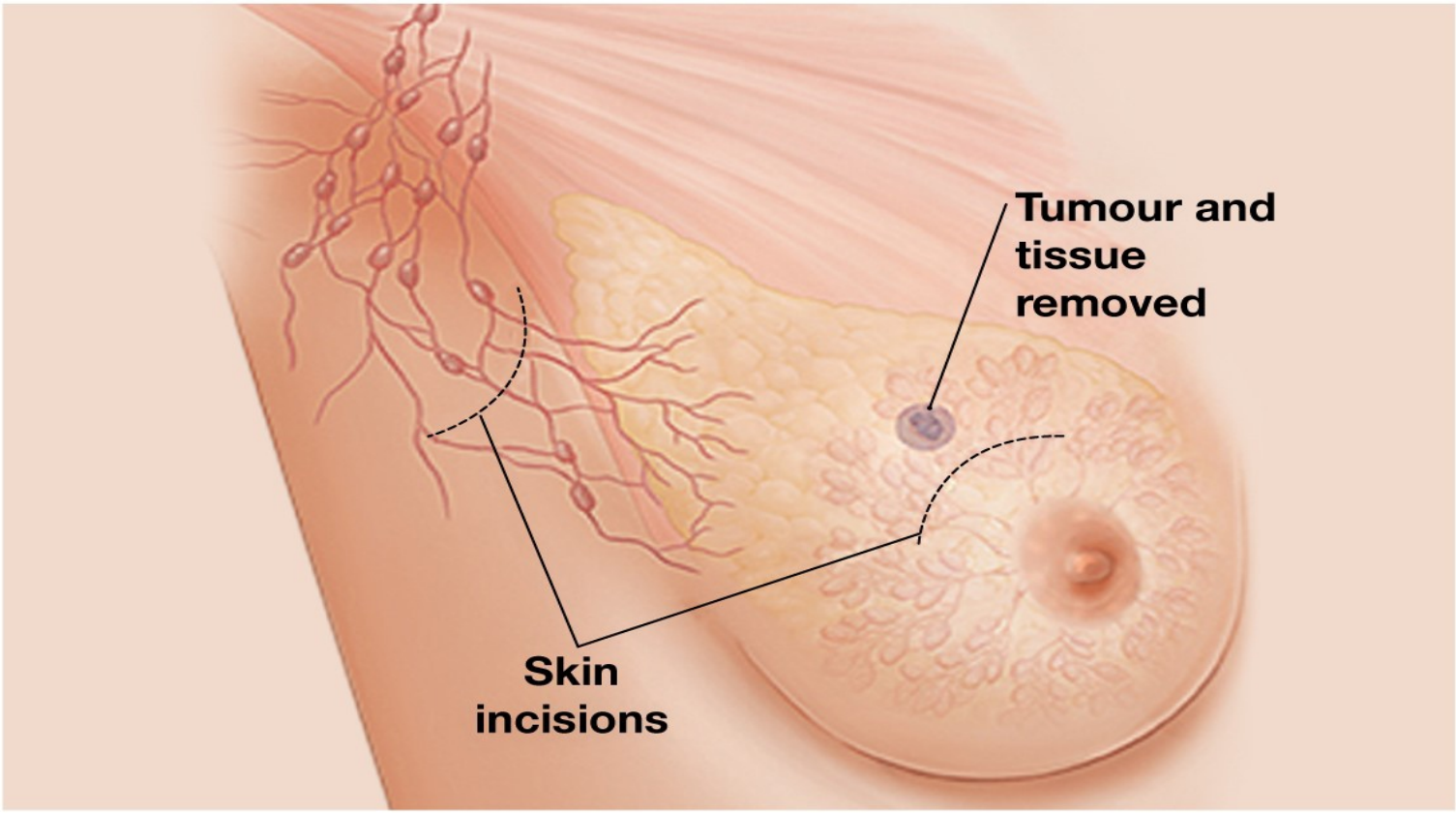

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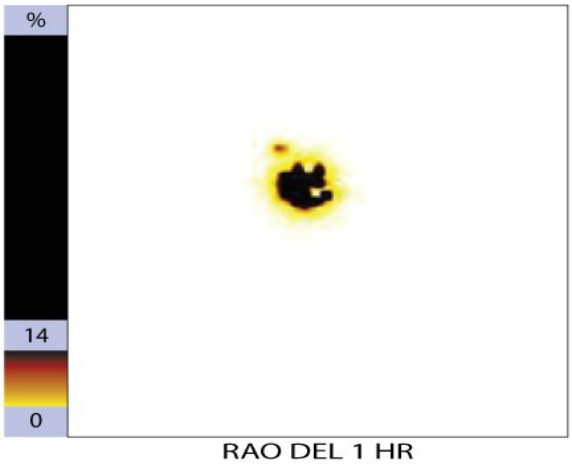

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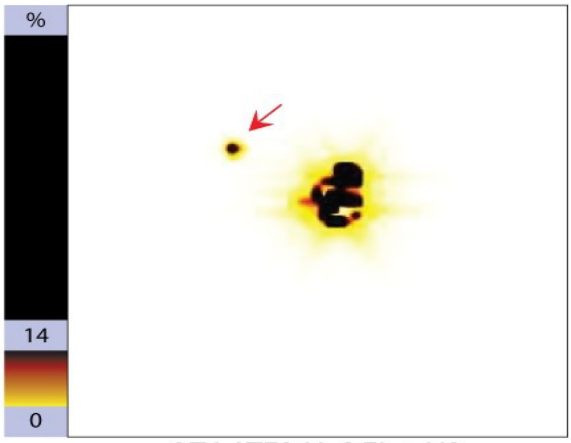

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Contents

SCIENTIFIC ARTICLE

Impact of standardization of in-ward urine output measurement in post - operative patients: a clinical audit

M. H. Prashath[1], G. S. Sandhakumari[2], R. C. Siriwardana[2]
[1]Professorial Surgical Unit, NCTH, Ragama.
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Keywords: Postoperative care; urine outputa audit

Abstract

Urine output (UOP) is a key parameter used in post-operative patients to monitor the recovery. In our setup, this is done by patients or caregivers. An audit cycle was carried out to develop and evaluate a standardized protocol to improve the accuracy of UOP measurement. The pre-audit assessment was done evaluating: individual's ability in measuring and record keeping, characteristics of the measuring container and error of measurement. Subsequently, corrections were done in these areas. The cycle was completed comparing the error of measurement as an outcome. The intervention group had fewer errors compared to the pre-audit group. Errors can be overcome by a standardized measuring protocol.

Introduction

Variation of urine output is a valuable surrogate marker of impending acute kidney injury (AKI) and tissue perfusion (1). Accurate measurement of urine output is also important in maintaining proper fluid balance in critically ill patients (2).

;In our setup, most of the patients after major surgery are managed in general wards. In our ward setup, the urine output (UOP) is measured usually by caretakers. No standardized methods are followed in the process of measurement. The usual practice is to visually read the recording in the urine-collecting bag and record it. Such readings are usually inaccurate. Errors can happen during urine measuring container manipulation, visual assessment and manual data recording. Errors that happen during measuring, monitoring and recording UOP can end up in delays of identification and early intervention of episodes of oliguria (3) hence clinical diagnosis and decision making.

We observed these drawbacks in our practice as well. An audit cycle was carried out focusing on standardizing the measurement of urine output of inward post-surgical patients.

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Methodology

Study sample

This clinical audit was carried out for 03 months. Twenty-five post-operative patients were included in the pre-audit assessment and another 25 post-operative patients were included in the re-audit cycle. Based on the first cycle results, intervention protocol was prepared to focus on standardizing the process. Accuracy of the urine output measurements was prospectively audited.

Inclusion and exclusion criteria

The primary inclusion criterion was patients undergoing major surgeries needing postoperative measurement of urine output. Patients younger than 18 years, the patient who can't read numbers, patients with visual impairments and patients who didn't give the consent to participate were excluded.

First audit cycle

In 25 (n=25) post-operative patients (group A) as the first step, using an interviewer-administered questionnaire data was collected on, individuals (patient's or bystander's) knowledge on volume reading from the measuring cup (figure 1), writing numbers, record keeping of volume. An interviewer observed the device used for measurements (whether it is a calibrated measuring container or not). Further interviewer assessed the volume reading ability and knowledge on numbers by giving pre-measured water sample and asking them to measure the volume and record it.

To measure the accuracy of measurement, patient or bystander was asked to measure the UOP for next 24 hours duration. Urine was collected to a separate large container given by the interviewer. After 24 hours, interviewer assessed the true volume of urine. As the outcome, the difference between true volume and patient's measurement was recorded. The difference over 50ml was considered significant.

Intervention protocol

Based on the findings three interventions were done. An information sheet was given to the patient/ caregiver as a step by step guide on the measuring process. Separate volume

recording chart indicating hours was prepared to document the UOP. Measurement of urine output was done by clearly calibrated volume measuring cups.

Re- audit cycle

Another 25 post-operative patients (group B, n = 25) participated in the re-audit cycle. Same data were collected in group B as described above.

Results

In the pre-audit group (group A) among 25 patients (n=25) there were 2 patients (8%) who didn't measure UOP at all. Caregiver measured majority (91.3%). Some patients' (17.4%) UOP was measured by more than a single caregiver as they changed within 24 hours. 65.2% had inadequate knowledge on volume reading from the measuring cup, while all had writing skills. 87 % patients used non-standardized measuring cups. In group A, 87% of patients had over 50 ml error.

After standardization of the process of measurement, education of the patient and correction of the device, group B had 10 % of patients with over 50 ml error of measurement ($p < 0.001$). According to the results, there was a significant reduction of error after the intervention.

Discussion

This audit shows that a simple instructions sheet, using a calibrated monitoring cup and providing a standard recording sheet significantly increases the accuracy of measuring the urine output. In a limited resource setup like in Sri Lanka patients, themselves or caregivers play a major role in the post-operative monitoring, unlike other countries where more accurate measuring devices like automatic sensing devices, electronic urinary output monitors are used (4).

UOP is a sensitive surrogate marker for AKI in postoperative patients. This provides an early warning signal for impending renal dysfunction (5). Inaccuracies in measuring urine output can affect clinical diagnosis and subsequent management of post-operative complications. Precise measurement of UOP will give the clinician a chance of timely intervention when necessary. Comparable issues were reported in other places as well. Hersch et.al evaluated the errors committed by the nursing staff when they take measurements visually compared to mechanical measurement. An average visual measurements error has been reported to be as high as 26% (6).

Figure 1. Standardized measuring container

The intervention we made was a simple change that can make a significant difference in accurate monitoring of post-operative patients. Adapting this strategy in our clinical setup in different units needs to be considered.

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.

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SCIENTIFIC ARTICLE

Chronic autoimmune thyroiditis: a challenging clinical entity in surgical practice

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Keywords: Thyroiditis; TPO antibody; FNAC; Ultrasound examination; associated malignancy

Abstract

Introduction

Chronic autoimmune thyroiditis is frequently encountered in surgical practice. However clinical data on chronic autoimmune thyroiditis has limited publications arising from Sri Lanka. This study presents our experience of this clinical entity which has differing thyroid morphologies and thyroid functional status at presentation.

Objective

The objective of this study was to analyse the spectrum of clinical profiles in patients with chronic auto immune thyroiditis attending at a surgical clinic. The clinical profiles analysed were the age and gender distribution, clinical presentation, thyroid functional status, thyroid peroxidase antibody (TPO Ab) status, Fine Needle Aspiration Cytology (FNAC) findings, Ultrasonographic (USS) assessment and association of thyroid malignancies. Formulation of a diagnostic guideline was also considered.

Study design

This is an observational study using the clinical profiles of patients with thyroid diseases registered in the surgical clinic from January 2009 to December 2018. Patients diagnosed to have chronic auto immune thyroiditis were included in this study. Different clinical profiles of these patients were analyzed.

Results

Out of 226 patients with thyroid diseases registered to the surgical clinic over a decade, 89 (39.4%) had chronic auto immune thyroiditis confirmed by either TPO Ab or FNAC or by both. Thyroid morphology and thyroid functional states of patients with chronic auto immune thyroiditis at presentation varied widely; 57.3%, 27% and 15.7% had diffuse goitre, multinodular goitre and solitary nodule respectively and 66.3%, 28.1% and 5.6% were hypothyroid, euthyroid and hyperthyroid state respectively. An USS of thyroid gland performed on 83 patients revealed sonographic features suggestive of thyroiditis in 67 patients (75.2%). The association between USS detected chronic autoimmune thyroiditis and the presence of hypothyroid state at presentation was statistically significant (p= 0.027). Associated thyroid malignancies were detected in thyroidectomy specimens of 6 patients; 5 were papillary and one was follicular carcinoma.

Conclusion

The thyroid morphology and functional status are not unique in patients with chronic autoimmune thyroiditis. There is a risk of having associated thyroid malignancy. USS evaluation of patients could be included in the guideline for diagnosis to mitigate the challenges faced in the surgical management of chronic autoimmune thyroiditis.

Introduction

Chronic autoimmune thyroiditis is a common clinical problem encountered in surgical practice. Many of them presents with goitrous hypothyroidism (1). Chronic autoimmune thyroiditis has a prevalence rate of 1-4% and incidence of 3-6/10000 population per year in the western world (2). The data on thyroiditis in Sri Lanka is sparse and precise incidence and prevalence is not known. Widespread use of iodized salt could cause increasing incidence of thyroiditis (1). Females of middle age are predominantly affected by chronic autoimmune thyroiditis (3).Clinical presentation of chronic auto immune thyroiditis varies widely and thyroid auto antibodies such as anti thyroid peroxidase antibody (TPO Ab) and Fine Needle Aspiration Cytology(FNAC) assessment have been used to confirm the diagnosis (4). Differentiated thyroid carcinomas and thyroid lymphomas have been associated with chronic autoimmune thyroiditis (5).

Background

The fist line investigation to confirm chronic auto immune thyroiditis is TPO Ab estimation. This was not available in Teaching Hospital Jaffna during the study period. As it is an expensive investigation at private laboratories, all clinically

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suspected patients with chronic auto immune thyroiditis were not requested for TPO Ab estimation. FNAC is an invasive investigation and the gold standard for diagnosing chronic auto immune thyroiditis. Though it was available in Teaching Hospital Jaffna, was difficult to perform in thyroiditis patients with small and atrophic thyroid glands.

Ultra Sound Scan assessment of thyroid is a noninvasive investigation, which not only identifies chronic auto immune thyroiditis but also could provide information about nodules suspicious of malignancy.

There are no clear guidelines in the management of chronic autoimmune thyroiditis and decision making in these patient could be challenging. This study aimed to formulate a suitable diagnostic guideline for effective surgical management based on the analyses of the spectrum of clinical profiles in patients with chronic auto immune thyroiditis.

Study design

This is an observational study, that has been carried out in a single surgical clinic of Department of Surgery, Teaching Hospital Jaffna from January, 2009.

Clinical profiles of patients with thyroid diseases registered in the surgical clinic from January 2009 to December 2018 were maintained in a database. Patients diagnosed with chronic auto immune thyroiditis were included in this study.

Clinical profiles analysed were the biographical data (age and sex) of patients, presenting complaints (including symptoms of altered thyroid function, musculoskeletal and neuropsychiatric symptoms), clinical signs related to altered thyroid function and thyroid morphology (diffuse, solitary nodule and multinodular goitre), investigation results (TPO, FNAC,USS) and histopathology reports of thyroid specimens of patients who underwent thyroidectomy.

TSH (thyroid stimulating hormone) (normal values 0.27-5.5 IU/ml), FNAC and USS of thyroid were carried out at the Pathology and Radiology Departments of Teaching Hospital Jaffna. Anti thyroid peroxidase (anti TPO) (normal values <35 IU/ml) was performed in those patients who were affordable and were willing to do it in private sector. It was estimated by ELISA (Enzyme Linked Immunosorbent Assay) method, using USA made BRIO Elisa analyzer reagent kit.

Different clinical profiles of chronic autoimmune thyroiditis were compared with local and international data to find out any unique difference in the prevalence of clinic-pathological parameters in the region. Statistical analysis of clinical parameters were done using IBM SPSS 21 and p-value < 0.05 was considered as statistically significant.

Results

Total number of patients with thyroid diseases registered to the surgical clinic over a decade was 226. Among them 140 patients had clinical suspicion of chronic auto immune thyroiditis and of them 89 had chronic auto immune thyroiditis confirmed by TPO Ab or by FNAC or by both.

Age and sex distribution of patients diagnosed to have chronic auto immune thyroiditis.

Among the 89 patients with chronic auto immune thyroiditis, there were 83(93.3%) females and 6(6.7%) male patients and the mean age of 39.27 years (ranging from 13 to 69 years).

Table 1. Age and sex distribution of patients with thyroiditis

Age group	No of patients (n=89)	Female	Male
1-20 years	8(8.9%)	8(8.9%)	0(0%)
21-40 years	41(46%)	38(42.7%)	3(3.4%)
41-60 years	34(38.2%)	32(38.2%)	2(2.2%)
61-80 years	6(6.7%)	5(5.6%)	1(1.1%)

Clinical presentation of patients with chronic auto-immune thyroiditis in this study

Table 2. Spectrum of presenting problem in patients with thyroiditis

Presenting problem	No of patients (n=89)
Neck lump only	73(82%)
Neck lump + Musculo skeletal symptoms	2(2.2%)
Neck lump + Hypothyroid features	5(5.6%)
Painful neck lump	9(10.1%)

Thyroid morphology of patients with chronic auto-immune thyroiditis in this study

Table 3. Spectrum of thyroid morphology in patients with thyroiditis

Morphology	No of patients (n=89)
Diffuse goitre	51 (57.3%)
Solitary nodule	14 (15.7%)
MNG	24 (27.0%)

Thyroid functional status of patients with chronic auto immune thyroiditis in this study

Euthyroidism has been defined as TSH levels within the reference range of 0.32–5.06 mIU/L ($0.32 \leq TSH \leq 5.06$). Other thyroid test results such as TSH >5.06 mIU/L and FT4 of 0.91–1.55 ng/dL, TSH>5.06 mIU/L and FT4<0.91ng/dL, TSH<0.32mIU/L and FT4 between 0.91–1.55ng/dL, TSH<0.32 mIU/L and FT4>1.55(ng/dL) were considered as subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism and overt hyperthyroidism, respectively (6). In our study subclinical hypothyroidism and overt hypothyroidism were considered as hypothyroidism and subclinical hyperthyroidism and overt hyperthyroidism were considered as hyperthyroidism.

Table 4. Distribution of thyroiditis patients according to thyroid functional status

Thyroid functional status	No of patients (n=89)	Female	Male
Euthyroid	25 (28%)	23	2
Hypothyroid	59 (66%)	55	4
Hyperthyroid	5 (6%)	5	0

66% of patients with chronic auto immune thyroiditis were hypothyroid at presentation

TPO Ab in patients with chronic autoimmune thyroiditis in this study

TPO Ab estimation is the first line investigation to confirm the diagnosis of chronic autoimmune thyroiditis. Among 89 patients with chronic autoimmune thyroiditis, only 38 patients got their TPO Ab estimation done.

Table 5. Distribution of patients with thyroiditis according to TPO Ab status

TPO Ab status		Number of patients	Female	Male
Test performed (n=38)	Positive	35	32	3
	Negative	3	3	
Test not performed		51	48	3

Out of 38 patients who had their TPO Ab test done 35(92.1%), had positive results (TPO Ab +)

FNAC of thyroid in patients with chronic autoimmune thyroiditis in this study

FNAC was performed to 80 patients at the Department of Pathology. Since TPO Ab test was not available at TH Jaffna, FNAC was the mainstay of investigation to confirm thyroiditis.

Table 6. Spectrum of FNAC findings in patients with thyroiditis

FNAC finding		No of patients (n=89)
FNAC performed	Thyroiditis	76 (85.4%)
	Colloid nodule	2 (2.2%)
	Normal thyroid	2 (2.2%)
FNAC not performed		9 (10.2%)

80 patients had their FNAC done and 76 of them (95%) had cytological evidence of chronic autoimmune thyroiditis.

Table 7. Thyroiditis patient distribution based on FNAC and TPO Ab (n=29)

FNAC	TPO Ab +	TPO Ab -
Thyroiditis +	22	3
Thyroiditis -	4	0

29 patients had both FNAC and TPO Ab tests done. 4 of them who did not have FNAC evidence of chronic autoimmune thyroiditis had TPO Ab in their serum. 3 of them who had FNAC evidence of chronic autoimmune thyroiditis did not have TPO Ab in their serum.

Table 8. Association of diagnostic investigations with thyroid functional state

Investigation		TPO (n= 38)		FNAC (n= 80)		USS (n=83)	
Thyroiditis		+	-	+	-	+	-
Thyroid Functional State	Euthyroid	10	01	23	01	18	06
	Hypothyroid	24	02	49	03	47	07
	Hyperthyroid	01	00	04	00	02	03
Not done		51		9		6	

Among the 35 patients with positive TPO Ab test, 24 (68.6%) were hypothyroid at presentation.

There was no statistically significant association between TPO Ab status and the thyroid functional state of patients (Fisher's exact test p-value =1.0).

Out of 76 patients who had cytological evidence of chronic autoimmune thyroiditis 49 patients (61.25%) were hypothyroid at presentation (p =0.856).

Among the 89 diagnosed patients, 83 had their USS assessment of thyroid gland. 67 patients (75.2%) with chronic autoimmune thyroiditis had USS features suggestive of the diagnosis. Sixteen patients (17.9%) did not have USS features suggestive of thyroiditis. Six patients (6.7%) did not have an USS assessment of thyroid. The association between USS detected chronic autoimmune thyroiditis and the presence of hypothyroid state at presentation was statistically significant (p= 0.027).

Associated thyroid malignancies in chronic autoimmune thyroiditis patients

Among the 89 patients with chronic autoimmune thyroiditis, 12 underwent thyroidectomy and the histopathology reports were analysed. Three patients (3.4%) with chronic autoimmune thyroiditis had associated papillary thyroid carcinomas. Furthermore, of 21 patients who were clinically suspicious of chronic autoimmune thyroiditis without TPO Ab and FNAC confirmation, 4 underwent thyroidectomy for suspicious thyroid nodule on USS evaluation. Histopathology report of three of these thyroid gland specimens revealed the presence of thyroid malignancy with chronic autoimmune thyroiditis; two were papillary carcinomas and one was a follicular carcinoma.

Hence, overall thyroid malignancies were detected in association with chronic auto immune thyroiditis in 6 thyroidectomy specimens; 5 were papillary and one was follicular carcinoma.

Discussion

The term “thyroiditis” includes a group of heterogeneous disorders characterized by inflammation of thyroid gland. Thyroiditis predominantly affects women. The clinical course of thyroiditis may be chronic, subacute and acute, depending on the underlying cause (5). Chronic thyroiditis includes chronic autoimmune thyroiditis and Riedel's Thyroiditis. Subacute thyroiditis includes painless postpartum thyroiditis, painless sporadic thyroiditis & painful sub-acute thyroiditis whereas acute thyroiditis will encompass acute suppurative thyroiditis (7).

Chronic autoimmune thyroiditis, painless postpartum thyroiditis and painless sporadic thyroiditis have an autoimmune basis (8).

Dr. Hakuru Hashimoto described enlargement and lymphoid transformation of thyroid in 4 women in 1912 (“struma lymphomatosa”) and identified antithyroid antibodies. This was named Hashimoto's disease or Hashimoto's thyroiditis, which is currently classified as chronic autoimmune thyroiditis (8).

Chronic autoimmune thyroiditis has two clinical forms, a goitrous form and an atrophic form. Both are characterized by the presence of thyroid auto antibodies in serum and by varying degrees of thyroid dysfunction; they differ only in the presence or absence of goitre (8). About 10%of patients with chronic autoimmune hypothyroidism have atrophic thyroid gland (7).

Table 9. Comparison of epidemiological data on thyroiditis with other regional studies

Country	% of total patients with thyroid disease	Female : Male	Mean age in years
USA (9) Staii et al	13.4%	11.7:1	47
India (10, 11) Thomas et al Sood et al	Not available 31.4%	8.6:1 10:1	34.18 (range 21-30)
Sri Lanka (1,3) Samarawickrama et al Siriweera et al Rajendra	12% 5.9% 39.4%	42:1 10.3 : 1 13.8:1	33 43.3 39.27

The prevalence of chronic autoimmune thyroiditis among the patients with thyroid diseases in this study in Jaffna is relatively high when compared to the data with loco regional studies.

Table 10. Comparison of clinical presentation of thyroiditis with other regional studies

Clinical presentation of patients with chronic autoimmune thyroiditis	% of patients in loco-regional studies (10,12)	% of patients in this study in Jaffna
Neck lump only	69.4% (Thomas et al, India)	82%
Neck lump + Musculo skeletal symptoms	25.5% (Becker et al, USA)	2.2%
Neck lump + Hypothyroid features	8.3% (Thomas et al, India)	5.6%

Most common presentation of patients with chronic autoimmune thyroiditis in Jaffna was goitre (neck lump) and only very few had musculoskeletal symptoms when compared with studies in loco-regional countries. Patients with chronic autoimmune thyroiditis presenting with hypothyroid symptoms at presentation were comparable to

that in India. Though patients with chronic autoimmune thyroiditis characteristically presents with painless neck lump, in 10.1% of the patients in this study presented with painful neck lump.

Table 11. Comparison of thyroid morphology with other regional studies

Country	Goitre			No goitre
	Diffuse	MNG	STN	
India (13,10)				
Chandanwale et al (n=110)	66.3%	30.9%	2.7%	-
Thomas et al (n=144)	47.2%	19.4%	2.7%	30.5%
SriLanka (1)				
Samarawickrama et al (n= 43)	23.3%	48.8%	20.9%	7%
Rajendra (n=89)	57.3%	27.0%	15.7%	-

Keeping in par with the loco-regional studies, diffuse goitre is the characteristic thyroid morphology in patients with chronic autoimmune thyroiditis in Jaffna. Anyhow, patients with chronic autoimmune thyroiditis in Jaffna presenting with solitary nodule of thyroid is not uncommon.

Table 12. Comparison of thyroid functional status with other regional studies

Country	Thyroid functional status based on TSH		
	Hyperthyroid	Euthyroid	Hypothyroid
USA(9) Staii et al (n=102)	None	46%	54%
India (10) Thomas et al (n=140)	21.4%	32.8%	45.7%
Sri Lanka (1) Samarawickrama et al (n= 43)	2.3%	48.8%	48.8
Rajendra (n=89)	5.6%	28.1%	66.3%

Majority of patients with chronic autoimmune thyroiditis in this study in Jaffna had hypothyroidism at presentation.

More patients with chronic autoimmune thyroiditis have high serum TPOAb than thyroglobulin antibody (14). TPO Ab is also found in sera of about 10% of normal adults, with an increasing prevalence (up to 30%) in older adults and thus low titers of TPO Ab is not specific for diagnosis (15). TPO Ab is directly involved in thyroid cells damage and positively correlated with the activity of chronic autoimmune thyroiditis (15). TPO Ab is found in over 90% of patients with autoimmune hypothyroidism (16).

A distinctive characteristic, supporting the clinical diagnosis of chronic autoimmune thyroiditis, is the presence of TPO Ab. Anyhow; it is present only in 50% of chronic autoimmune thyroiditis patients who are euthyroid (17). When chronic autoimmune thyroiditis is suspected clinically, a test for TPO Ab and measurement of the serum TSH (thyrotropin) concentration are generally sufficient to confirm the diagnosis (8).

Table 13. Comparison of TPO Ab and thyroid functional state with other regional studies

Country	Patients with TPO Ab +	Patients with TPO Ab + who have Hypothyroidism
USA Staii et al (9)	29	21 (72.4%)
Iran Ghoraishian et al(15)	866	281 (32.4%)
India Sood et al (11)	61	42 (68.8%)
Sri Lanka Rajendra	35	24 (68.6%)

Prevalence of hypothyroidism in TPO Ab positive patients in this study in Jaffna seems similar to that in loco-regional countries except that found in Iran.

FNAC assessment of chronic autoimmune thyroiditis

Fine Needle Aspiration Cytology (FNAC) is considered as the gold standard technique to diagnose chronic auto immune thyroiditis (13).

Hurthle (oxyphilic) cell change, infiltration of follicles by lymphocytes / plasma cells , epithelioid granuloma with giant cells and lymphoid follicle formation and moderate amount of background colloid are the features characteristic of chronic auto immune thyroiditis (Hashimoto's thyroiditis) (18).

Fine needle aspiration cytology (FNAC) has an **accuracy rate of 92%** in diagnosing chronic autoimmune thyroiditis (19). FNAC can miss the diagnosis of chronic auto immune thyroiditis in few cases due to inherent limitations of this procedure and also due to varying cytomorphological features such as with other lesions like multinodular goiter with degenerative changes, follicular neoplasm, Hurthle cell neoplasm, papillary carcinoma, reactive lymphnode and lymphoma (20).

FNAC can have false negative and false positive rates. The false negative rate (FNR) is the percentage of patients reported to have benign cytology by FNAC, who are found to have a malignant lesion confirmed on thyroidectomy. FNR ranges from 1.5 to 11.5%. The false positive rate (FPR) is the percentage of patients reported to have thyroid malignancy by

FNAC, who are found to have a benign lesion on histological examination. FPR ranges from 1.2% to 6% (19).

In this study in Jaffna, 80 patients diagnosed to have chronic autoimmune thyroiditis underwent FNAC assessment and 76 of them (95%) had cytological evidence lymphocyte infiltration. In a study carried out in India, 55 out of 65(84.6%) patients had cytological evidence lymphocyte infiltration (11).

FNAC and hypothyroidism

Table 14. Comparison of FNAC and hypothyroidism with regional studies

Country	FNAC + and elevated TSH
USA Staii et al(9)	53.9%
India Sood et al (11)	63.07%
Sri Lanka Rajendra	64.5%

FNAC and TPO Ab

Table 15. Comparison of FNAC and TPO Ab status with other regional studies

Country	FNAC + and TPO Ab +
USA (9) Staii et al	65%
India	
Sood et al (11)	78.5%
Thomas et al(10)	87.7%
Sri Lanka **Colombo** Fernando et al(21) **Jaffna** Rajendra	65% 75..8%

Lymphocytes that can produce antithyroid antibodies could be found in the thyroid glands of patients with chronic autoimmune thyroiditis without evidence of a peripheral immune response (ie TPO Ab – ve and FNAC + ve). This suggests that the possibility of chronic autoimmune thyroiditis to exist as an organ-restricted autoimmune disorder (22). Three patients who had FNAC evidence of chronic autoimmune thyroiditis in this study did not have TPO Ab in their serum.

Sometimes there is lack of correlation between TPO Ab levels and FNAC diagnosis of chronic autoimmune thyroiditis especially in children and young adult patients. This could be because that in early stage of disease, antibody production is confined to intrathyroidal lymphocytes (Organ restricted). Likewise some patients with significant titres of TPO Ab may not have FNAC proven chronic autoimmune thyroiditis (ie TPO Ab + ve and FNAC - ve). This could be due to the fact that focal lymphocytic thyroiditis (Focal Auto Immune Thyroid Disease) which is an early lesion that can be missed by FNAC (10). Four patients who did not have FNAC evidence of chronic autoimmune thyroiditis in this study had TPO Ab in their serum.

Ultrasonographic assessment of thyroid in patients with chronic auto immune thyroiditis

Characteristic USS findings in chronic autoimmune thyroiditis are hypo-echogenicity, coarse echo-texture, increased vascularity and micronodules. Echogenicity of thyroid is compared to the strap muscles. Normal thyroid gland is uniformly hyperechoic. In chronic autoimmune thyroiditis the thyroid gland is classified as hypoechoic as its echogenicity will be equal to or less than the strap muscles. Normal thyroid has fine echo-texure whereas it will have coarsened echotexture in chronic autoimmune thyroiditis. Nodules in Hashimoto's thyroiditis are known as micro-nodules and their size will be ≤6 mm. Although the other similar nodules that are hyper and hypoechoic are included as micronodules yet the solitary nodules and dissimilar nodules are not classified as micronodules. Colour Doppler is used to assess thyroid vascularity (23).

Hypoechogenicity and increased vascularity are most sensitive parameters to diagnose Hashimoto's thyroiditis where as micronodules were most specific parameter for the diagnosis. Coarsened echo texture has an intermediate sensitivity and specificity for diagnosis of Hashimoto's thyroiditis by ultrasonography (23). The USS examination is 78.5% sensitive and 95.2% specific in diagnosing chronic autoimmune thyroiditis. The positive and negative predictive values of USS examination for chronic autoimmune thyroiditis are 88% and 90.9%, respectively. The overall accuracy of USS in diagnosing chronic autoimmune thyroiditis is 90.1% (23). It was 74.2% in this study.

Need for a guideline to assess patients with chronic auto immune thyroiditis

In a study performed at a tertiary hospital in Sri Lanka, it was shown that the sensitivity of ultrasonography in diagnosing thyroiditis was 89.47% while the specificity was 96.3%. Its positive predictive value was 94.4% (24). Features

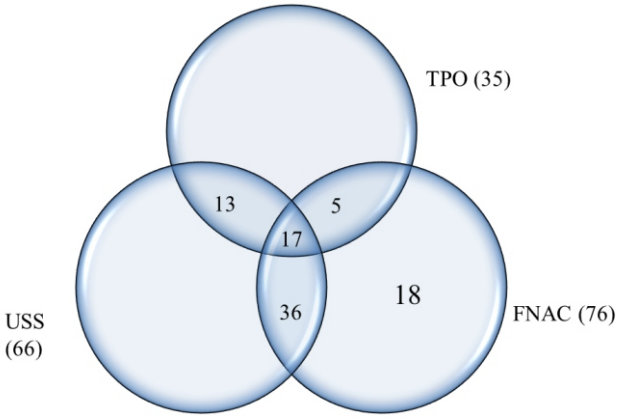

Figure 1. Positive investigation results among thyroiditis patients in this study at a glance

considered to suggest malignancy in a thyroid nodule are hypoechogenicity, solid consistency, greater nodular height than width, presence of micro calcifications, absence of peripheral halos or presence of an interrupted halo, presence of intranodular vascularity and presence of peripheral vascularity. It has also been shown that combination of these ultrasonographic characteristics will improve the diagnostic accuracy of identifying malignant nodules in thyroid (24).

In this study, 4 patients underwent thyroidectomy for suspicious nodule on USS evaluation. Histopathology report of three thyroid gland specimens of these patients revealed the presence of thyroid malignancy with chronic auto immune thyroiditis. These three patients did not have positive finding in either TPO Ab or FNAC test.

As chronic autoimmune thyroiditis has a risk of associated malignancy it could be useful to have guidelines for its diagnosis and management.

Suggested guideline for diagnosing patients with chronic autoimmune thyroiditis

TPO Ab, USS and thyroid function tests (TFT) can be used to evaluate chronic autoimmune thyroiditis and FNAC can be performed on any suspicious lesion to detect existence of associated malignancy.

Conclusions

The following conclusions could be made from this study on the spectrum of clinical profiles in chronic autoimmune thyroiditis in a cohort of patients from Jaffna:

- The thyroid morphology and functional status are not unique in patients with chronic autoimmune thyroiditis.
- Females are mostly affected especially in the 20-40 years of age.
- Many of the patients have diffuse goitre and hypothyroidism at presentation.
- There is a risk of having associated thyroid malignancy.
- USS evaluation of patients could be included in the guideline for diagnosis.

Limitations

- The study was conducted in a single surgical clinic and this may not represent the entire patient population with thyroid diseases in Jaffna.

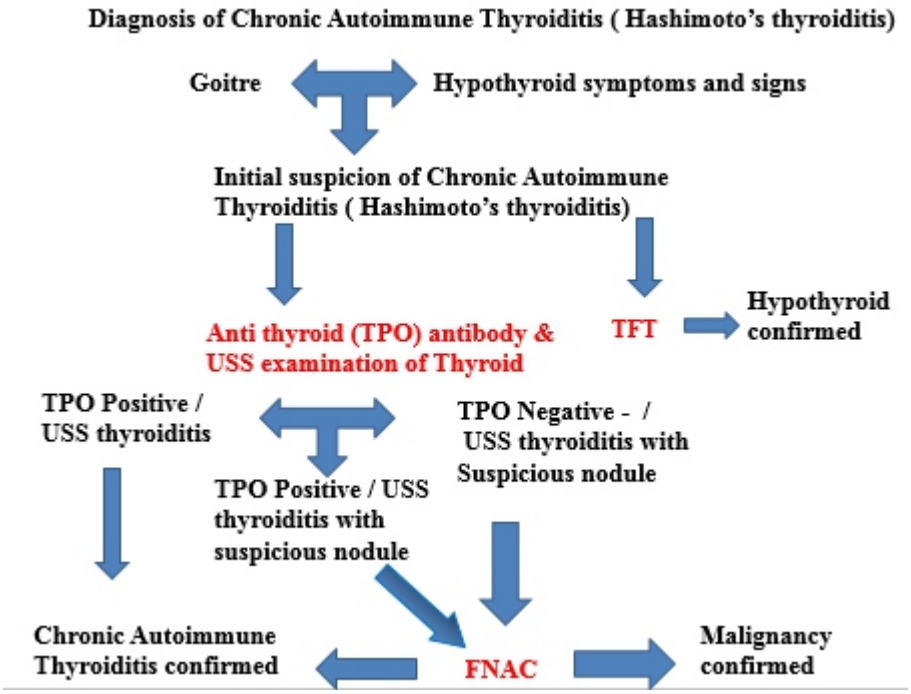

Figure 2. Suggested guideline for diagnosing patients with chronic autoimmune thyroiditis

- TPO antibody test was not performed in all cases clinically suspected to have chronic autoimmune thyroiditis.
- The yield of FNAC of thyroid may differ according to the experience of the cytologist.
- The USS assessment for thyroiditis may be subjected to observer variations.

Recommendations

A larger population study is warranted for further evaluation of above conclusions and finalizing the diagnostic guideline for chronic autoimmune thyroiditis.

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.

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SCIENTIFIC ARTICLE

High frequency of Klinefelter syndrome in a cohort of Sri Lankan males with azoospermia and oligozoospermia

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Keywords: Azoospermia; Karyotyping; Klinefelter syndrome; Male infertility; Oligozoospermia

Abstract

Introduction

Introduction: Klinefelter syndrome (KS) is the most common sex chromosomal aneuploidy. It affects 1:667 males. It is a major cause of male factor infertility due to the associated testicular atrophy. This study aims to describe the karyotype pattern identified in a cohort of Sri Lankan infertile males referred for cytogenetic testing as a component of the urological evaluation.

Materials and methods

The karyotype reports of males with severe oligozoospermia (sperm cell count <5 million cells/ml in seminal fluid analysis) and azoospermia, who were referred for karyotyping between January 2010 and February 2019 were maintained prospectively in an anonymized database and analysed retrospectively. All patients were referred from a single urological practice. Karyotyping was performed on routinely cultured lymphocytes after GTG-banding according to the guidelines of the International System for Human Cytogenetic Nomenclature (2016).

Results

A total of 69 infertile males underwent karyotyping. 40 (58.0%) had azoospermia and 29 (42.0%) had severe oligozoospermia. Abnormal karyotypes were seen in 14 (20.3%) males, comprising of 11 (78.6%) with KS (47, XXY) and 3 (21.4%) with 46,XX karyotype. Polymerase chain reaction for *SRY* gene was positive in one male with 46,XX karyotype. Among the KS patients, 6 (54.6%) had azoospermia and 5 (45.5%) had severe oligozoospermia.

Conclusions

KS accounted for more than two-thirds of the chromosomal anomalies among the infertile males referred for karyotyping. These findings highlight the need for cytogenetic evaluation of severe oligozoospermic and azoospermic males prior to undertaking extensive invasive investigations and treatment measures in both partners.

Introduction

Klinefelter syndrome (KS) is the commonest sex chromosomal aneuploidy. It affects 1:667 males (1). Majority have the 47, XXY karyotype, while other mosaic and non-mosaic forms such as 48,XXXY, 49,XXXXY, 46,XY/47,XXY have also been reported (2). The additional X chromosomes cause abnormality in testicular germinal layer functions, leading to hypergonadotropic hypogonadism and male infertility (2).

Seminal fluid analysis (SFA) has a sensitivity rate of 89.6% in diagnosing male infertility and can identify 9 out of 10 infertile men (3). KS individuals are known to have severe oligozoospermia or azoospermia in their SFA (4). Thus, karyotyping is routinely carried out in developed countries when either severe oligozoospermia or azoospermia are observed in the SFA, with a view to detecting underlying genetic conditions such as KS (5, 6).

Yoshida et al., reported significantly higher chromosomal abnormalities in males with low testicular volume, and high levels of serum follicular stimulating hormone (FSH) or luteinizing hormone (LH) (7). It is noteworthy that the clinical features of hypogonadism and other laboratory findings such as raised serum FSH and LH levels are taken into consideration when deciding on recommendations for cytogenetic testing.

At present, there is paucity of data on the frequency of Klinefelter syndrome among Sri Lankan infertile males. Currently, there are also no national guidelines for cytogenetic testing of such individuals in our health care setting. This study, therefore aims to describe the karyotype pattern identified in a cohort of Sri Lankan infertile males referred for cytogenetic testing as a component of the urological evaluation.

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Materials and methods

The karyotype reports of Sri Lankan males diagnosed with severe oligozoospermia (sperm count <5million cells/ml) or azoospermia, who were referred for cytogenetic testing between January 2010 and February 2019 were maintained prospectively in an anonymized database and was analysed retrospectively. All patients were referred from a single urological practice. The study was approved by the Ethics Review Committee of the Faculty of Medicine, University of Colombo (Protocol no. EC-13-181).

Conventional karyotyping was performed by an experienced cytogeneticist on peripheral blood lymphocytes after routine chromosome culture and GTG-banding according to the guidelines of the International System for Human Cyto-genetic Nomenclature (2016). In each case, a minimum of 20 well-banded metaphase spreads were examined at 450-500 resolution to identify the presence of any numerical or structural abnormalities. In individuals with the 46,XX karyotype, polymerase chain reaction (PCR) for the presence of the sex-determining region on the Y chromosome *(SRY)* gene was performed using standard published protocols by Ke-hui-cui (8).

Results

Out of the total 69 infertile males who underwent karyotyping, 40 (58.0%) had azoospermia and 29 (42.0%) had severe oligozoospermia. Abnormal karyotypes were seen in 14 (20.3%) males, comprising of 11 (78.6%) with KS (47, XXY) and 3 (21.4%) with 46, XX karyotype. Among the KS patients, 6 (54.6%) had azoospermia and 5 (45.5%) had severe oligozoospermia. PCR for *SRY* gene was positive in one male with the 46, XX karyotype, due to *SRY* translocation to the X-chromosome, and the other two were negative for *SRY* gene. The karyotype data are shown in Table 1.

Table 1. Karyotypes identified in azoospermic and severe oligozoospermic males

Karyotypes identified in azoospermic males		
Semen analysis	**Karyotype**	**Number of patients (%)**
Azoospermia	46,XY	31 (77.5%)
	47,XXY	6 (15.0%)
	46,XX	3 (7.5%)
Total		40
Karyotypes identified in severe oligozoospermic males		
Severe Oligozoospermia	46,XY	24 (82.8%)
	47,XXY	5 (17.2%)
Total		29

Discussion

Among the numerous factors causing male infertility, underlying chromosomal abnormalities are known to play a prime role. The clinical phenotypes associated with these chromosomal anomalies may not be apparent during the early years of life leading to presentation of these males later in their adulthood with infertility.

Wosnitzer reported that 3%-5% of males with severe oligozoospermia and 14%-19% of males with azoospermia in their SFA had abnormal karyotypes, with the majority being non-mosaic KS (9). Similarly, a Japanese study conducted by Nakamura et al., identified that 12.6% (225/1790) infertile males had chromosomal abnormalities, and the most frequent anomaly was KS in 28.4% (64/225) (10). In the present study, one fifths of the cohort had abnormal karyotypes and KS accounted for more than two-thirds of the chromosomal anomalies among the infertile males. However, a study limitation that may have contributed to the high frequency of KS observed in this cohort might be that it was performed on infertile males referred from only a single urological practice.

KS (47,XXY) characteristically presents with hypogonadism, raised FSH, LH and low testosterone levels (9). Azoospermia was observed in 54.6% and severe oligozoospermia in 45.5% of males with KS in the present study. Several other studies have also reported KS to be associated predominantly with azoospermia and severe oligozoospermia (11). European and American guidelines recommend performing karyotyping and genetic counseling in males who present with severe oligozoospermia and azoospermia (5, 6). The European Association of Urology (EAU) guidelines 2016, recommends performing standard karyotype analysis in all men with sperm count <10 million/ml who seek fertility treatment (5). The American Urological Association (AUA) recommends carrying out karyotyping in patients with much lower sperm counts (<5 million/ml). Infertile males who have had a past history of fertility and those who have had prior sperm counts above 5 million cells/ml in SFA are usually not recommended to undergo cytogenetic testing (6). Prognostic information for guiding fertility treatment is a necessity in KS patients as the available treatment modalities are not only expensive but also undergoing such interventions are emotionally and psychologically taxing for the affected couples.

Apart from KS, individuals who are phenotypically male with the 46,XX karyotype may also present with infertility. One such patient in the present study had 46, XX karyotype and the PCR for the *SRY* gene was positive. This finding along with the patient's clinical phenotype, which included small testicular volume and azoospermia were consistent with De La Chapelle syndrome. Two other males with the 46,XX karyotype tested negative for the *SRY* gene using PCR.

In such cases, *SRY* gene sequencing would need to be performed to identify point mutations which are not detectable by PCR. Majority of the 46,XX males are known to be azoospermic. A similar finding was observed in our study.

The paucity of data on the chromosomal abnormalities underlying male factor infertility and lack of established national guidelines on cytogenetic evaluation of such males are current challenges facing the practice of fertility treatment in Sri Lanka. The high prevalence of KS in this cohort highlights the need for cytogenetic testing of severe oligozoospermic and azoospermic males to help avoid extensive and invasive investigations in both partners and unnecessary physical and psychological burden on them.

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.

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SCIENTIFIC ARTICLE

Outcome of popliteal arterial injuries presenting to the Teaching Hospital, Anuradhapura

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Keywords: Popliteal arterial injury; popliteal venous injury; outcome; fracture; amputation

Abstract

Introduction

Popliteal artery (PA) injury is an emergency that has a high limb threat potential.

Methodology

This is a retrospective study of those with documented PA injuries in bed head tickets among those presenting with arterial injuries to the Teaching Hospital, Anuradhapura (THA) from January 2017 to June 2019. Demography, anatomical details of injury, concomitant injuries, type of surgical intervention and perioperative outcomes were assessed.

Results

Twenty case records were studied. Eighteen (90%) were males, with a mean age of 38.7 years (18-69). Eight (40%) were following motorcycle accidents and 7 (35%) were trap gun injuries. Median ischemic time was 9.5 hours (3-29). Seventeen (85%) had associated fracture or dislocation (p0.003). Four (20%) had associated venous injury. Seven arteries (35%) were contused, 6 (30%) were lacerated. Eleven (55%) underwent reversed saphenous vein graft repair, end to end anastomosis was done in 1 (5%) and ligation was done in 2 (10%). None of the patients underwent fasciotomy at the hospital where they were admitted first. Nine of fourteen patients (64.3%) had all compartments viable on fasciotomy. Two (10%) patients following trap gun injury who also had associated venous injury underwent amputation. Concomitant venous injury had a significant association with amputation rate (p 0.0316)

Conclusion

Motorcycle accidents and trap guns were the leading cause of PA injury. PA injury was significantly associated with fractures around the knee joint. Concomitant popliteal venous injury, which is common after trap gun injury, had significant association with poor outcome.

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Introduction

Popliteal arterial injury is a potentially life or limb threatening vascular emergency. The close anatomic relationship of the popliteal artery to the distal femur, proximal tibia and knee joint apparatus makes it extremely vulnerable to injury in the case of skeletal and joint injuries in the knee region. Popliteal arterial injury is commonly associated with fractures of the tibial plateau, supracondylar femur fractures and knee joint dislocations from road traffic accidents.

Trap gun injuries are also common in rural Anuradhapura and adjacent districts. There are approximately 200 admissions annually to Teaching Hospital, Anuradhapura following trap gun injuries which is one of the leading causes of popliteal arterial injury with associated musculoskeletal trauma (1).

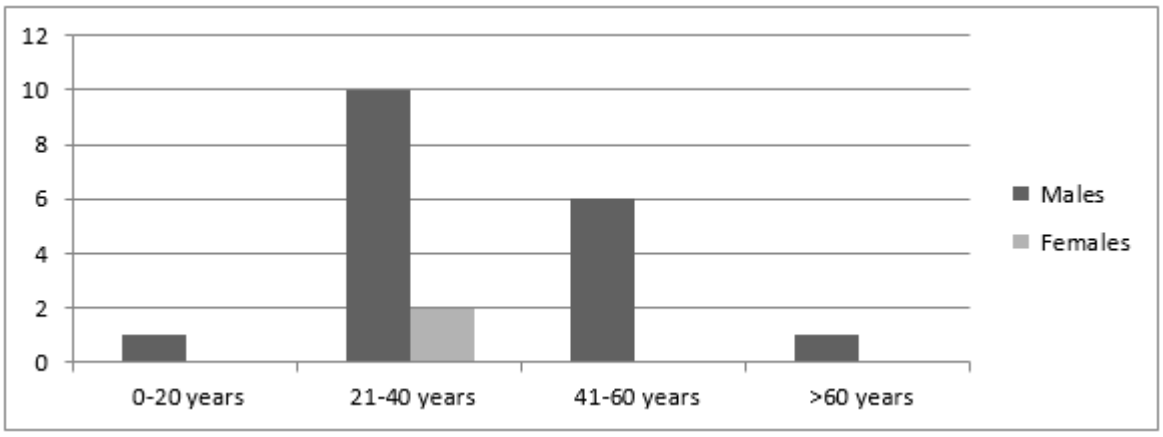
Paucity of Sri Lankan literature is noted regarding civilian popliteal arterial injuries. Available studies regarding popliteal arterial injury describe mainly the war time experiences. The aim of this study is to describe the injury pattern, associated factors, treatment and perioperative outcome of popliteal arterial injuries presenting to THA.

Methodology

This was a retrospective study from available hospital records of those treated for PA injury at the Teaching Hospital, Anuradhapura from 01st January 2017 to 31st June 2019. Patients with arterial injuries, but poor documentation were excluded from this study.

Patient demographics, mechanism of injury, arterial level of injury, associated fractures or dislocation, muscle viability, definitive vascular surgical intervention, ischaemic time, orthopaedic intervention and outcome were included as study variables.

The data analysis was done using SPSS v.21. Categorical data was analysed using Fisher Exact Test and one sample Binominal test. A 'p' value of less than 0.05 was taken as statistically significant.



Graph 1. Age and gender of study population

Results

Twenty patients with case records were studied. Eighteen (90%) were males (p 0.000). Mean age was 38.7 years (Range 18-69). Eighteen (90%) patients were in the 21-60 year age group (Graph 1).

All had been transferred from another hospital. Mean distance of transfer was 102km (Range 28-195). Distance between THA and other hospitals was less than 50km in only 6 (30%), from 51km to 100km in 4 (20%), from 101km to 150km in 8 (40%) and more than 150km in 2 (10%). Median ischaemic time was 9.5 hours (Range 3-29)

Eleven (55%) of PA injuries were following road traffic accidents. Eight (40%) were in motorcyclists and one was a pedestrian. Of the remaining 9, seven (35%) were from trap guns and two (10%) were iatrogenic during orthopaedic internal fixations. PA injuries were significantly associated with fractures (p 0.003) Details of the type of skeletal and joint injuries associated with PA injuries is depicted in table 1.

Spanning external fixation was done in 13/17 (76.5%) prior to vascular repair. 2/17 (11.8%) had internal fixation of tibial plateau fracture during which procedure iatrogenic injury of popliteal artery occurred. Plaster of Paris back slab immobilization was done in 2/17 (11.8%) who had fibular head fracture.

PA injury was associated with popliteal vein injury in 4 (20%) and common peroneal nerve injury in 1 (5%). Concomitant popliteal venous injury, 3/7 were more commonly seen following trap gun injuries (p= 0.1011). Traffic accidents had a significant association with PA contusions (p=0.04) while trap guns caused significantly more arterial lacerations (p=0.04).

Reversed saphenous venous graft repair was done in 11 (55%) patients. Five (25%) underwent thrombectomy only. End to end anastomosis was done in 1 (5%) patient. Venous patch repair was done in 1 (5%) patient. Ligation was done in 2 (10%) patients who had concomitant popliteal artery and vein injury following trap gun injury.

None had a fasciotomy prior to transfer to THA. Fourteen patients were subjected to fasciotomy at THA prior to vascular repair. Nine (64.3%) had all 4 compartments viable with a mean ischaemic time of 8.5 hours. One (7.1%) had three compartments viable with 17 hours of ischaemia. Another (7.1%) had two compartments viable after 13 hours of ischaemia and one (7.1%) had only one viable compartment with 7 hours of ischemia. All the compartments were non-viable with a mean ischemic time of 9.5 hours in 2/14 (14.2%) who also had concomitant popliteal vein injury and both were from trap gun injuries.

Table 1. Associated skeletal injuries

Fracture / Dislocation	Open fractures	Closed fractures	Number of cases
Tibial plateu fracture	0	7	7
Tibial plateu fracture with knee joint dislocation	1	1	2
Tibial plateu fracture with supracondylar	0	1	1
femur fracture	0	1	1
Supracondylar femur fracture	0	2	2
Extra-articular proximal tibial fracture	1	0	1
Extra-articular proximal tibial fracture	2	1	3

Table 2. Arterial level injury

Arterial level injury	Trap gun injury	RTA	No of cases
Documented			15
Contusion	1	6	7 (46.7%)
Laceration	5	1	6 (40 %)
Spasm	1	1	2 (13.3%)
Not assessed due to fibrosed popliteal fossa			2

Only those two were subjected to primary amputation. Details of the type of arterial injury, concomitant injuries, ischaemia time, compartment viability, revascularization and early outcomes are depicted in table 3.

Discussion

The data presented shows that young males (mean age - 38.7 years), particularly motorcyclists (40%) are at risk of PA injury. Such injuries are likely to have a major economic impact on young families. Similar data has been reported in other regional and international studies on injuries to PAs (1, 2, 3, 4). Preventive measures targeting vulnerable motor-cyclist needs emphasis. Trap gun injuries are still a major cause (35%) and a continuing concern in rural Sri Lanka. THA has attributed approximately 200 admissions annually to injuries from trap guns (5). The only two primary amputations were following trap gun accidents and must have been due to the extent of soft tissue injuries, contamination and associated popliteal venous injuries. Implementation and enforcement of the existing legal framework against trap gun users is mandatory to prevent trap gun injuries and associated morbidity and mortality.

The known association between PA injury and fracture-dislocations around the knee was confirmed in this small study. However, our patients with PA injuries had more closed injuries as opposed to most other series that have reported open injuries (1, 2, 3, 4, 6). Interestingly, the poor outcomes reported when PA injuries were associated with fracture dislocations (10) were not seen our series.

In our study population 4 (20%) had concomitant PA and vein injury. Two of these patients presented with dead muscle in all four compartments and underwent primary amputation. Another with concomitant venous injury had three nonviable muscle compartments after only 7 hours from injury pointing to the understandably adverse influence on muscle viability. Primary amputation had a significant association with concomitant PA and vein injury (p=0.0316) in our series and is in keeping with results reported elsewhere (7).

Table 3. Summary of Outcome (No - number, Sex - Male, F - Female, RTA - Road Traffic Accidents, PA - Popliteal Artery, PV - Popliteal Vein, NV - Non Viable, ND - Not Documented, IT - Ischemic Time, RSVG - Reversed Saphenous Vein Graft, EE - End To End Repair, LR - Lateral Repair, TG - Trap Gun, IJ - Iatrogenic Injury, Comp - Compartment Viability, AV - All Compartments Viable, T – Thrombctomy, VP - Venous Patch)

No	Age	Sex	Mechanism	Vessel	IT	Comp	Surgery	outcome
1	37	M	RTA	PA + PV	7.0	3NV	RSVG, VEIN - LR	Healing & salvaged
2	69	M	RTA	PA	13.0	AV	RSVG	Healing & salvaged
3	60	M	RTA	PA	29.0	ND	RSVG	Healing & salvaged
4	37	M	TG	PA	6.0	AV	RSVG R	Healing & salvaged
5	35	M	TG	PA + PV	5.0	AV	T + VEIN LR	Healing & salvaged
6	37	M	TG	PA	8.0	AV	RSVG	Healing & salvaged
7	41	M	TG	PA + PV	9.0	4 NV	LIGATION	Amputated
8	40	M	RTA	PA	7.0	AV	T	Healing & salvaged
9	18	M	RTA	PA	18.0	ND	RSVG	Healing & salvaged
10	33	M	RTA	PA	11.0	AV	RSVG	Healing & salvaged
11	58	M	RTA	PA	15.0	ND	T	Healing & salvaged
12	47	M	TG	PA	8.0	AV	T	Healing & salvaged
13	42	M	RTA	PA	6.5	AV	EE	Healing & salvaged
14	36	F	RTA	PA	17.0	1 NV	T	Healing & salvaged
15	24	M	RTA	PA	3.0	ND	RSVG	Healing & salvaged
16	26	M	TG	PA + PV	10.0	4 NV	LIGATION	Amputated
17	42	M	TG	PA	6.0	ND	RSVG	Healing & salvaged
18	28	M	IG	PA	13.0	2NV	RSVG	Healing & salvaged
19	27	F	IG	PA	13.0	ND	RSVG	Healing & salvaged
20	37	M	RTA	PA	12.0	AV	VP	Healing & salvaged

Considering the long distances patients had to travel to get to the THA following PA injuries it is not surprising that ischemia times reaching 29 hours, median 9.5 hours, were well beyond the commonly taught 6 hour cut off. Immediate fasciotomy and an aggressive approach to revascularise and to deal with reperfusion whenever did pay off in the short term in not having to amputate in the perioperative period. Of course a long-term follow up is needed to establish if revascularizing severely damaged limbs is worthwhile.

Finally, four compartment fasciotomy at the primary hospital may have minimised ischaemic damage to skeletal muscle (8) during transfer of patients to THA. Unfortunately none of those treated at the THA had the benefit of a pre-transfer fasciotomy and it may be necessary to make fasciotomy a prerequisite in all instances where a patient with an extremity arterial injury is transferred.

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.

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REVIEW ARTICLE

Surgical management of papillary thyroid cancer: review of current evidence and consensus

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Keywords: Papillary thyroid cancer; surgical management; prophylactic lymph node dissection

Abstract

The optimal surgical management of papillary thyroid carcinoma has been an ongoing debate. Most recommendations in clinical practice guidelines are based on large retrospective studies and expert opinion. The objective of the article is to summarize the recent evidence and main arguments related to the surgical management of papillary thyroid carcinoma. A definitive correlation between loco-regional recurrence and long-term survival and the extent of thyroid resection or lymph node dissection have not been established through randomized controlled clinical trials. Due to the low rates of recurrence and mortality associated with papillary thyroid cancer, large scale prospective randomized controlled trials that will help identify the optimal surgical management are unlikely to be available in the future as well. According to current consensus, hemithyroidectomy is sufficient for low-risk disease whereas total thyroidectomy should be performed in those with high-risk features. The place of therapeutic and prophylactic central compartment and lateral neck dissection is discussed based on evidence on short-term and long term outcomes. Furthermore, post-operative staging and dynamic risk stratification are important in determining adjuvant therapy and a follow-up plan.

Introduction

Thyroid cancer is common in both developing and developed countries and is one of the most rapidly increasing cancers in many countries including the USA and UK (1). Papillary thyroid carcinoma (PTC) is the commonest type of primary thyroid malignancy (2). The rapid increase in incidence in most parts of the world has been largely attributed to the increased diagnosis of asymptomatic or subclinical lesions, although an actual increase is also a likely contributor (2, 3).

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The debate on optimal surgical treatment for PTC has been gaining popularity, especially in terms of the need for surgery and the extent of thyroid resection for low-risk disease as well as the need and the extent of neck lymph node dissection. The main objectives in managing PTC are reducing disease-related morbidity, disease recurrence, and morbidity of treatment while improving disease-specific and overall survival. Surgical management of PTC is mainly carried out with therapeutic intentions but is also considered in situations of diagnostic uncertainty. The extent of gland removal, intraoperative techniques for preservation of related nerves and parathyroid glands are important considerations of surgical management. Due to the low recurrence and disease-specific mortality rates from PTC, to gain sufficiently powered level 1 evidence on the ideal initial surgical management requires a large-scale, expensive and prolonged randomized control trial which is impractical (4). Therefore, management protocols are primarily based on large scale retrospective analyses and expert opinion.

Hemithyroidectomy versus total thyroidectomy

Optimal surgical management is the cornerstone of treatment which improves prognosis while thyroid-stimulating hormone (TSH) suppression and radioiodine ablation act as adjuncts to the treatment. Recent studies have attempted to resolve the ongoing argument regarding the place of total thyroidectomy versus hemithyroidectomy concerning the impact on outcomes. Total thyroidectomy has the potential benefits of removing possible multifocal disease involving the contralateral lobe, ability to administer radioactive iodine therapy to ablate residual thyroid including metastatic disease and follow up for tumour recurrence with serum thyroglobulin levels.

Hemi thyroidectomy is recommended in certain instances with diagnostic uncertainty such as in patients with Thy 3 (Bethesda IV) fine-needle aspiration cytology (5). Follicular variant of PTC may fall into Thy 3f category when the nuclear features minimally favour PTC. Furthermore, when a patient presents with a well-defined small lesion suggestive of PTC, a hemithyroidectomy may be performed as a diagnostic procedure (6).

The extent of the therapeutic surgery depends on the size of the primary tumour, status of the contralateral lobe, extrathyroidal spread (loco-regional or distant metastasis) and patient factors. When the size of the primary tumour is less than 10mm, it is defined as micropapillary carcinoma.

Unifocal micropapillary carcinoma without evidence of metastasis is managed with hemithyroidectomy alone although other associated high-risk factors may warrant total thyroidectomy (7). Extra thyroidal extension, multifocal disease, bilateral involvement, poor differentiation and infiltrative growth pattern are recognized as high-risk factors (8). In micropapillary carcinoma, the presence of multifocal disease involving both lobes will require a total thyroidectomy (7). Therefore, personalized decision making should be considered in patients with other above-mentioned risk factors. Management of PTC other than micropapillary category depends on the size of the tumour and other associated risk factors.

Lower risk of local recurrence is reported after total versus hemithyroidectomy in some studies possibly due to the propensity for multifocality in PTC (9, 10). However, with proper patient selection based on risk stratification, loco-regional recurrence rates have been reported to be less than 1-4% (11). Evolution of the surgical management of PTC was largely based on retrospective data. Earlier, all PTC larger than 1cm in size were managed with total thyroidectomy irrespective of the local, nodal or distant metastatic status (12). This practice was largely based on analysis of retrospective data from the national cancer database which included 52,173 patients who underwent thyroid surgery (43,227 had a total thyroidectomy, 8946 had hemithyroidectomy) between the period of 1985–1998 (13). This study showed that total thyroidectomy group had a low risk of 10-year recurrence (7.7% vs. 9.8%, $P<0.05$) and mortality compared with hemithyroidectomy ($p=0.04$, $p=0.009$, respectively). Since this was a retrospective analysis, the data in relation to the high-risk category such as extrathyroidal extension and extent of resection were not available. Because of these reasons, the decision to proceed with total or partial thyroidectomy remained unclear. Further analysis of the database was carried out by Adam et al (14) which included 61,775 patients who had a primary tumour size of 1-4cm from the same database between 1998 and 2006. The complexity and severity of the disease were considered as additional variables. The overall survival benefit which was observed in the previous study was not demonstrated. A similar observation was made during subgroup analysis based on tumour size of 1-2cm and 2-4cm (14). Furthermore, 5432 PTC patients from Surveillance, Epidemiology, and End Results (SEER) program were analysed by Haigh et al. and found to have no difference between the total versus hemithyroidectomy groups in terms of 10-year overall survival (15). This analysis was carried out in relation to the risk category by AMES (Age, Metastases, Extent of disease, and Size) classification system. A recent analysis of the same database including 23,605 patients failed to show an overall survival difference between the two methods of thyroidectomy (16). Moreover, multivariate analyses including the stage of the disease, gender, radioiodine use failed to demonstrate a significant difference in overall survival in relation to the extent of surgery.

The paradigm shift from mandatory radioiodine ablation to selective use of radioiodine has also contributed to the selection with regard to the extent of surgery. Furthermore, the use of neck ultrasound scan and serial thyroglobulin measurements for the detection of recurrence than using radioiodine scan has also facilitated the decision-making process. However, the follow-up burden is a significant factor in hemithyroidectomy (17). The interpretation of thyroglobulin levels in the setting after a hemithyroidectomy is challenging than with total thyroidectomy and ultrasonographic detection of central nodal recurrence has also interfered after hemithyroidectomy.

Minimizing surgical morbidity

Intraoperative strategies to minimize the nerve damage and preservation of parathyroid glands are important to minimize postoperative morbidity following thyroidectomy. The two main nerves at risk are the external branch of the superior laryngeal nerve (EBSL nerve - supplies the cricothyroid muscle to alter the tension of vocal cords) and the recurrent laryngeal nerve (which supplies the all the other laryngeal muscles except cricothyroid muscle). The ideal way to prevent the damage to EBSL nerve is direct visualization and the preservation (18, 19). Meticulous skeletonisation of the superior pole while dissecting close to the thyroid capsule and ligation of superior thyroid vessels is practised to minimize nerve injury. In relation to recurrent laryngeal nerve, routine visualization of the nerve during dissection of the area at risk has shown a lower incidence of nerve damage than avoiding the nerve (18, 19). Intra-operative neuromonitoring is also used to prevent recurrent laryngeal nerve damage. However, a systematic review with meta-analysis comparing nerve visualization versus intra-operative neuromonitoring showed no statistical significance (20).

Preservation of parathyroid glands is also achieved by direct visualization. All measures should be undertaken to perform a meticulous dissection on the thyroid capsule and ligation of the inferior thyroid arterial branches close to the capsule of the gland (21, 22). Autotransplantation of parathyroid glands into the sternomastoid muscle should be considered in an event of inadvertent removal of the gland or in a situation where the

adequacy of vascularity of the glands is in doubt. Routine inspection of the thyroidectomy specimen should be carried out to identify inadvertently removed parathyroid glands.

Lymph node dissection in papillary thyroid cancer

Prophylactic central compartment lymph node dissection

Retrospective analyses of large databases suggest that lymph node metastasis is associated with higher mortality particularly in older patients (>45 years) (23). However, in those with clinical N0 disease, prophylactic central compartment node dissection (PCCND) has not proven to be beneficial in improving disease-specific or recurrence-free survival (5). PCCND is useful for accurate staging, reduction of locoregional recurrence, reduction of thyroglobulin concentration and in de-bulking before radioiodine therapy (5, 24). However, the loco-regional recurrence is reported to be only 2% in pN1 but clinically negative lymph nodes (cN0) and approximately 4% in patients with less than five involved lymph nodes (25). Therefore, to prevent one loco-regional recurrence, an estimated 20–30 PCCNDs are required (5).

Several systematic reviews and meta-analyses have been performed on the usefulness of PCCND. However, they contain mainly data from retrospective series. The findings were non-uniform and recent meta-analyses failed to detect significant differences in rates of loco-regional recurrences or permanent complications in those undergoing PCCND (26-28). Therefore the British Thyroid Association guidelines do not recommend PCCND for those without clinical or radiological evidence of nodal involvement and those with low-risk factors (<45 years, classical papillary thyroid histology, unifocal disease, tumour diameter less than or equal to 4 cm, and absence of extra thyroid extension). Bilateral PCCND may be offered individually in those with high-risk features (age ≥ 45 years, unfavourable histology subtypes, multifocal disease, tumours >4 cm in diameter and extension beyond the thyroid) after weighing the potential benefits against the morbidity due to surgery. Unilateral PCCND has no proven advantage and thus not recommended (5).

Prophylactic lateral neck lymph node dissection

Node positivity is seen in up to 23% of patients with positive central compartment lymph nodes who undergo prophylactic level III and IV lateral neck dissection (29). Furthermore, the 5 year-recurrence rate of lateral neck nodes following total thyroidectomy and PCCND was 6% (30). Lateral node dissection may help in better staging in approximately half of the patients with positive central neck nodes who are at risk of developing lateral neck lymph node involvement. However, there is a lack of evidence to show an improvement in the loco-regional control and overall survival at the expense of overtreatment in more than 75% of patients. Therefore, prophylactic lateral neck dissection in those without central compartment lymph node involvement is unwarranted (5, 31). Personalized decision making is recommended to decide on prophylactic lateral neck dissection in those with central compartment lymph node metastasis, as clear evidence for improvement in outcomes is still not established (5).

Therapeutic lymph node dissection

Overt metastatic disease in the lateral lymph nodes has been shown to have clinical or radiological central lymph node involvement in >80%. In those with no evidence of central neck nodes, there is still a high risk of histological involvement (>80%) (5). Therefore, in patients with overt metastasis in the lateral neck nodes, a therapeutic central and selective lateral neck dissection including levels IIa-Vb lymph nodes is warranted, preserving key structures including the internal jugular vein, accessory nerve and sternomastoid muscle. Therapeutic compartment oriented neck dissection is associated with improved survival and lower recurrence rates and therefore, widely accepted (32). Those with suspicious lateral neck nodes should be confirmed by fine needle cytology before surgery or intra-operative frozen section.

Newer surgical techniques for papillary thyroid cancer

Newer surgical techniques such as endoscopic thyroidectomy have been utilised to achieve complete resection while improving cosmetic results. Various endoscopic techniques such as axillary, breast, submental and transoral approaches have been described. Despite the experience gained using such techniques in thyroid surgery, the utility in PTC remains controversial. A systematic review and meta-analysis by Chen et al (33) showed that there are limitations in endoscopic surgery due to the difficulty in obtaining views in the restricted space. Furthermore, endoscopic techniques were inferior in terms of operative time, hospital stay and transient recurrent laryngeal nerve palsy. Moreover, despite similar tumour recurrence rates in the short and medium-term, the surgical completeness which may not be optimal could potentially lead to higher longer-term recurrences (33).

Monitoring response to treatment and follow-up

Post-operative staging of PTC is recommended as a prognostic measure. This provides information to plan for further strategies in relation to surveillance and to decide on therapeutic measures. American Thyroid Association guidelines classify patients into low, intermediate and high-risk categories. This classification depends on the extent of locoregional tumour invasion, adequacy of resection, the aggressiveness of histology, extent of ablation by radioiodine and the presence of specific genetic mutations (e.g.: BRAF). Serum thyroglobulin measurement should be carried out after 6 weeks following total thyroidectomy or radioiodine

treatment (34, 35). TSH suppression in patients who did not receive radioiodine ablation is not recommended and usually maintained at a range between 0.3 to 2.0mU/l. Patients who underwent total (or near-total) thyroidectomy followed by radioiodine ablation need re-classification based on the risk of cancer recurrence.

This dynamic risk stratification has been shown to correlate closely with the future risk of disease recurrence. For dynamic risk stratification, structural and functional status is obtained by biochemical investigations and imaging after 9 to 12 months of initial treatment with total or hemithyroidectomy and radioiodine ablation. Four types of responses are described according to imaging, biochemical and structural evidence of disease, and used to describe the status of disease during follow-up (36, 37).

The excellent response is defined as the absence of radiological, biochemical or structural disease. In these patients, target serum TSH should be in the same range as for the patients who did not undergo radioiodine treatment (36, 38). Patients are categorized as a biochemically incomplete response following the detection of abnormal thyroglobulin levels or rising anti-thyroglobulin antibody levels without any evidence of localized disease.

In the presence of persistent or new loco-regional recurrence or distant metastasis, patients are classified into structurally incomplete response group. In these patients, serum TSH should be maintained below 0.1mU/l (36, 38, 39). The indeterminate response is defined when the patient does not show definite biochemical or structural abnormalities that can be classified into benign or malignant categories. In such patients, TSH should be maintained between 0.1 to 0.5 mU/l for 5 to 10 years and re-assessment is recommended for further management (36, 38, 39).

Conclusion

The existing evidence on surgical management of PTC and the current consensus have been reviewed and summarized. A definitive correlation between loco-regional recurrence and long-term survival and the extent of thyroidectomy or lymph node removal have not been established through randomized controlled clinical trials. Therefore, a single surgical strategy may not be universally applicable to all patients. Decision making on the extent of thyroid resection and lymph node dissection should be made by careful analysis of pre-operative and intra-operative prognostic factors. This should also be balanced against the risk of surgical morbidity and patient preference. Furthermore, post-operative staging and dynamic risk stratification are important in determining adjuvant therapy and a follow-up plan.

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REVIEW ARTICLE

Quality measures for lower gastrointestinal endoscopy: a review of recent consensus statements and guidelines

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Keywords: Quality; lower gastrointestinal endoscopy; colonoscopy

Abstract

Colonoscopy is utilised in the diagnosis and treatment of disorders of the lower gastrointestinal tract. Complete visualization of the large intestinal mucosa and also the terminal ileum should be done safely and in a well-tolerable manner. Colonoscopy plays a major role in screening for colorectal cancer and is useful in the early detection and prevention. Prevention of colorectal cancer requires prompt detection of potentially precancerous lesions and resection. In recent decades, considerable variation in performing colonoscopies and outcomes have been reported and therefore, the necessity for standardization of the procedure with quality measures was recognized. Quality/ performance measures are defined as indicators that aid in quantifying health-care processes and help to achieve high quality healthcare. Several quality indicators have been proposed in relation to pre-procedure preparation, intra-procedure and post-procedure events. Some of these quality measures include adenoma detection rate, caecal intubation rate, withdrawal times and quality of bowel preparation. Endoscopists should not only ensure adequate quality in relation to the above parameters but should also have high compliance rates with recommended guidelines on indications, evidence based screening and surveillance intervals. These will ensure better colonoscopy yields while maintaining high standards of patient safety and will translate into better patient outcomes.

Guidelines proposed by the American Society of Gastro-intestinal endoscopy/American College of Gastroenterology and European Society of Gastrointestinal Endoscopy/United European Gastroenterology and recent evidence were analysed and the summary of the recommendations have been discussed in this review. Although these guidelines are not based on evidence from the Asian populations, it may still be useful to adopt these key quality measures for colonoscopy in Asia. This will be helpful in the evaluation of daily practice at the endoscopy unit. However, guidelines targeting the regional population should be formulated in the future.

Introduction

Variations in the endoscopists' performance and several nationwide initiatives of colorectal cancer (CRC) screening programs resulted in the necessity for standardization of lower gastrointestinal endoscopy (1). During the recent decades, many potential quality control measures have been described and several scientific bodies have formulated guidelines and recommendations on quality measures for colonoscopy (2, 3). Initial recommendations were found to be numerous, country specific and was based on expert opinion rather than evidence based which limited its wide scale utilisation. Therefore, steps were taken to identify the significant quality measures and to shortlist the performance indicators that may be more practical and widely applicable (2, 3).

The American Society of Gastrointestinal Endoscopy/ American College of Gastroenterology (ASGE/ACG) and European Society of Gastrointestinal Endoscopy/United European Gastroenterology (ESGE/UEG) proposed their guidelines on key quality indicators which were derived from favourable clinical outcomes and enhanced quality of life. Furthermore, a practical and simple approach for quality measurement were analysed highlighting the area for improvement and were found to be widely adaptable (2, 3). In this review, we summarise the key quality or performance indicators proposed by these guidelines and discuss its relevance and usefulness. The rising incidence of CRC and inflammatory bowel disease in the region has become a significant burden and requires colonoscopies to be performed with adequate standards in terms of diagnostic yield and patient safety (4-6).

Quality indicators were categorised into pre-procedure, intra-procedure, and post-procedure and key performance measures were described (Table 1).

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Table 1. Summary of recommendations of quality in Colonoscopy

	Quality indicator	Measure type	ASGE/ACG		ESGE/UEG		
			Evidence	Target (%)	Evidence	Target (%)	Consensus agreement
	Pre-procedure						
1	Proportion of colonoscopies with proper indication and documentation of indication	Process	1C+	>80	Moderate	=85%	93.80%
2	Proportion of colonoscopies performed following fully documented informed consent	Process	1C	>98	ND	ND	ND
3	Minimum time slot for colonoscopy (minutes)	Structure	ND	ND	No evidence	30-45	100%
4	Proportion of colonoscopies that follow recommended surveillance protocols for post-polypectomy, post cancer-resection and screening	Process	1A	=90	ND	ND	ND
5	Proportion of colonoscopies that follow recommended surveillance protocols for inflammatory bowel disease	Process	2C	=90	ND	ND	ND
	Intra-procedure						
6	Proportion of colonoscopies that properly document quality of preparation	Process	3	>98	ND	ND	ND
	Proportion of adequate bowel preparation	Process	3	=85	Moderate	=90%	100%
7	Proportion of visualization of the caecum with photo-documentation	Process	1C				
	a) Caecal intubation rate with photography (all examinations)			=90	Moderate	=90	97.90%
	b) Caecal intubation rate with photography (screening)			=95	ND	ND	ND
8	Proportion of adenoma detection in asymptomatic average-risk individuals	Outcome	1C	=25	Moderate to high	=25	100%
	Adenoma detection rate for male patients			=30	ND	ND	ND
	Adenoma detection rate for female patients			=20	ND	ND	ND
9	Proportion of polyp detection in patients = 50 years	Outcome	ND	ND	Low	40%	84.60%
10	Proportion of measurement of withdrawal time	Process	2C	>98	ND	ND	ND
	Average withdrawal time in negative-result screening colonoscopies (minutes)	Process	2C	=6	Moderate	=6 min	87.50%
11	Proportion of obtaining biopsy specimens when colonoscopy is performed for an indication of chronic diarrhoea	Process	2C	>98	ND	ND	ND
	Proportion of obtaining recommended tissue sampling for surveillance in ulcerative colitis and Crohn's colitis	Process	1C	>98	ND	ND	ND
12	Proportion of endoscopic removal of pedunculated polyps and sessile polyps <2 cm is attempted before surgical referral	Outcome	3	>98	ND	ND	ND
	Appropriate polypectomy technique	Process	ND	ND	Low	= 80%	93.30%
13	Proportion of non-diminutive polyp (>5mm in size) retrieval	Process	ND	ND	Very low	=90%	86.70%
14	Rectal examination and rectal retroflexion	Process	ND	ND	ND	ND	ND
15	Advanced imaging assessment	Process	ND	ND	No evidence	Unknown	93.30%
16	Adequate description of polyp morphology	Process	ND	ND	Very low	Unknown	84.60%

* ASGE/ACG: The American Society of Gastrointestinal Endoscopy/ American College of Gastroenterology; ESGE/UEG: European Society of Gastrointestinal Endoscopy/United European Gastroenterology; ND: Not defined

Pre-procedure quality indicators

The quality measures in the pre-procedure period consist of those implemented before administrating the sedative medication and inserting the colonoscope (2).

1. Appropriate indication for colonoscopy

It is mandatory to document the indication clearly and when it is a nonstandard indication, the justification for doing colonoscopy should be documented. Furthermore, it is encouraged to review and document previous colonoscopies with date, findings, interventions and histology.

2. Informed written consent

Consent should be obtained from the patient or guardian for each colonoscopy while discussing the benefits, adverse events and other alternatives to endoscopy (2). The common adverse events such as perforation, bleeding, infection, missed lesions and adverse events related to sedation, bowel preparation and intravenous access should be disclosed and explained to the patient.

3.Time slot allocated for colonoscopy

A minimum of 30 minutes should be taken for a routine colonoscopy while at least 45 minutes should be taken for colonoscopies for faecal occult blood testing to permit therapeutic interventions (3). Proper assessment of the colon requires adequate time and there is evidence to show that productivity pressure may negatively influence the quality of the procedure (3).

4.Appropriate surveillance protocols following post-polypectomy, post-cancer resection and negative screening colonoscopies.

The rationale is to maintain a high yield while ensuring cost-effectiveness and minimising harm by optimising the interval between colonoscopies. These recommended intervals assume that effective complete examination of the large bowel with good bowel preparation was carried out while clearing all neoplasia and precancerous lesions.

Brenner et al have shown that negative screening colonoscopy was related to protection against CRC for 20 years (7). Furthermore, a repeat colonoscopy after 5 years following a negative screening colonoscopy resulted in very low yield. Thus a consensus of 10 years interval following a routine negative screening colonoscopy was reached. Lack of awareness about the guidelines has resulted in more frequent colonoscopies leading to negative studies with increased risk and cost (2). Guidelines for intervals between examinations following the detection of a pre-cancerous lesion depends on the successful clearance during colonoscopy, size, number and the histology type of the precancerous lesion (8). The British guidelines classify the baseline colonoscopy into three categories: High-risk category (more than five small adenomas or three adenomas-one > 10mm), Intermediate risk category (three to four small adenomas or one >10mm) and low-risk category (less than three small adenomas <10mm). The next surveillance colonoscopy should be discussed with the patient and scheduled for high risk at one year, intermediate-risk at three years and low risk, no surveillance or at 5 yearly intervals (9). Evidence for certain precancerous lesions such as serrated adenomas is limited (8).

5. Appropriate surveillance protocols for inflammatory bowel disease

Long term ulcerative colitis and Crohn's disease (CD) are associated with increased risk of cancer (5, 6). Patients with colitis should be subjected to endoscopic surveillance starting from 8 years after initial manifestation (not after initial diagnosis). Risk factors which determine the frequency of surveillance are primary sclerosing cholangitis, first degree relative with CRC, strictures, previous dysplasia not undergone resection, post inflammatory polyps and extent of inflammation.

Patients with isolated ulcerative proctitis and CD without colonic inflammation are not at increased risk to develop CRC and should not have screening colonoscopies. According to the risk factors, the European Crohn's and Colitis Organisation guideline stratifies the risk to develop CRC as high-risk (needs colonoscopy annually), intermediate-risk (needs colonoscopy every 2-3 yearly) and low-risk (needs colonoscopy every 5 yearly) (10).

Intra-procedure quality measures

Good quality assessment of the large bowel includes complete intubation of the colon and a thorough mucosal examination. The intra-procedure component begins at the administration of sedative agents, or insertion of the scope in cases without sedation, to complete withdrawal of the endoscope and includes diagnostic and therapeutic manoeuvres (2).

6. Quality of bowel preparation

The quality of colonoscopy is largely determined by the quality of bowel preparation. Bowel preparation is related to caecal intubation and adenoma detection rates (ADR) which are important quality measures in colonoscopy (3).

Terms such as good, fair and poor or scoring systems may be used. However, there are shortcomings in using each of the above (2). Several validated scales are available such as the Ottawa Scale, Boston Bowel Preparation Scale (BBPS) and the Aronchick Scale. BBPS is recommended by the ESGE guidelines as the preferred scale (3). Irrespective of the scoring method, quality of bowel preparation should be

documented depending on the ability to detect polyps, at least >5 mm in size following adequate suctioning of retained fluid or faeces. If bowel preparation is inadequate, a repeat colonoscopy should be performed within 1 year (8). Poor bowel cleansing reduces the effectiveness of colonoscopy in the detection of lesions, performing therapeutic procedures and prolongs examination and withdrawal time (2).

Patients' understanding and compliance are essential in bowel preparation and successful colonoscopy. A systematic review of 56 studies analysed the patients' perception and barriers in bowel preparation and colonoscopy. Factors such as lack of awareness, anxiety, the anticipation of pain, embarrassment and vulnerability were patient reported barriers in bowel preparation and colonoscopy. Therefore, these should be addressed to improve quality of preparation (11).

Furthermore, patients' perception of the quality of their bowel preparation was found to be unreliable and therefore, the bowel cleansing regime should be strictly completed to achieve adequate preparation (12). According to Hillyer et al, a patient's inability to tolerate the full course of purgative was considered the most common barrier to optimal bowel preparation (13). To improve the patients' tolerance and compliance, the ASGE recommends split-dosing of bowel preparations for all patients, i.e. half the bowel preparation is administered on the day of the procedure, allowing a snack on the night before the procedure during the time the patient would be otherwise advised to be fasting for solids (2). If the proportion of inadequate bowel preparation is greater than 15%, protocols should be re-examined in terms of patient education, agent used and the protocol of administration (2).

7.Caecal intubation (CI) and photo-documentation of landmarks

Visualization of the cecum by identification of landmarks and photo-documentation should be achieved in at least 90% and 95% in all examinations and screening colonoscopies respectively (2).

CI is the passage of the tip of the colonoscope just proximal to the ileocaecal valve, completely visualising the caecal caput and the part between the appendiceal orifice and ileocaecal valve. Low CI rates are related to increased rates of interval proximal large bowel malignancies as a substantial proportion of cancer originate from the right colon (14). Failed CI results in further costs and inconvenience due to rescheduling examination or arranging alternative investigations (14). CI should ideally be photo-documented by naming the identified caecal landmarks, specifically the ileocaecal valve and appendiceal orifice.

Colonoscopies aborted due to inadequate bowel preparation or severe colitis and subsequent procedures following a recent full colonoscopy done for therapeutic purposes need not be included in determining CI rates.

8. Adenoma detection rate (ADR)

The rate of adenoma detection in asymptomatic, average-risk individuals for screening should be greater than 25% of the population (for males >30% and females >20%) (2, 3).

A large scale study (15) presented the ADR in 223,842 patients who underwent 264,792 colonoscopy procedures by 136 gastroenterologists, with a follow up of 10 years. The ADRs ranged from 7.4% to 52.5% and were sorted into quintiles during the analysis. The unadjusted risks for interval CRC in the ADR quintiles from highest to lowest were found to be increasing substantially (4.8, 7.0, 8.0, 8.6, and 9.8 cases per 10,000 person-years of follow-up) (15). A 3% decrease in the incidence of CRC with a 5% decrease in the cancer-related mortality was shown for each 1% rise in ADR highlighting its significance (15). Based on this new evidence, minimum targets for ADR was formulated. Thus, all colonoscopists should measure their ADRs, and those with overall ADRs less than 25% must take measures for improvement. However, minimum targets for ADR for the South Asian population where there is a lower incidence of CRC and adenomatous polyps, have not been determined. Nevertheless, the above targets may be utilised as performance indicators without considering these as the standard of care.

ADR is now considered the single most useful quality assessment in colonoscopy. Colonoscopists with higher ADRs clear colons of precancerous lesions better and follow up patients at shorter intervals. This is because the recommended intervals for repeat assessment are smaller in precancerous lesions. Those with low ADRs detect lesser patients with precancerous lesions and multiple lesions, putting patients at greater risk for CRC. This is by failing to clear the large bowel from precancerous lesions and assigning inappropriately longer intervals for a repeat colonoscopy. Therefore, knowing the personal ADR is important to ensure optimal patient protection (16).

However, there are several concerns regarding ADR as the best overall quality measure. ADR requires documentation of histology data which needs extra effort from the endoscopy unit. Secondly, it will reward a “one and done” approach i.e. after identifying one polyp endoscopically compatible with an adenoma, there may be a natural tendency to refrain from assessing the remaining colonic mucosa as meticulously.

Several other alternatives to ADR such as polyp detection rate (PDR) which has the advantage of not requiring pathological data have been considered. However, there is a lack of

evidence to support PDR as an alternative quality indicator for ADR (17). Adenoma per colonoscopy (APC) rate is another alternative to ADR which is now being used commonly used in clinical trials (18). APC overcomes the problem of "one and done". However, may lead to increased pathological costs if each polyp is sent separately for pathological analysis. Use of photography to document the identification of multiple adenomas may help to overcome this problem. Several simple interventions such as education, feedback, and standardising the quality of colonoscopy have shown to increase ADR (3).

9. Polyp detection rate (PDR)

PDR is easier to measure than ADR as histological verification is not required. A recent study showed that PDR was non-inferior to ADR in terms of CRC risk prediction (19). However, in general, there is still a lack of evidence to support PDR as an alternative to ADR. ESGE guidelines proposed a minimum standard of 40% for PDR (3). PDR may be used instead of ADR if there is limited availability of histology. However, there is a potential risk of "gaming" where pressure on quality may result in the removal of non-neoplastic lesions ("so-called polyps") that would otherwise go unidentified in-order to falsely increase the PDR (3).

10.Withdrawal time

The minimum withdrawal time for a negative screening procedure is 6 minutes (2, 3).

Careful inspection of the colon takes times. Increased identification of significant neoplastic lesions is noted when the mean withdrawal time is 6 minutes. Nevertheless, withdrawal time is only secondary to ADR in measuring quality. Therefore, in those with high ADR withdrawal time may not be essential. However, withdrawal time may help as a supportive tool to help correct the performance of those with substandard ADR (20). Furthermore, variation in withdrawal technique is more essential than the withdrawal time which is difficult to assess (3).

11.Tissue sampling

Patient's chronic diarrhoea due to microscopic colitis (lymphocytic and collagenous colitis) may have macroscopically normal mucosa. Thus requiring multiple biopsies of otherwise unremarkable appearing colon (2).

In inflammatory bowel disease, a recent randomized study showed that pancolonic chromoendoscopy and targeted biopsies gave a better yield of dysplasia with fewer biopsies (21). However, a systematic biopsy protocol can be utilised as an alternative (22).

12. Endoscopic polypectomies

The majority of sessile polyps less than 2 cm in size are readily removable endoscopically, depending on their shape, size, location and accessibility (23). Endoscopic resection is more economically feasible and safer than surgery (23). Difficult polypectomies should be referred to experienced endoscopists before surgical referral. In that case, snare resection of even a part of the polyp should be avoided as it may create a false-positive non-lifting sign, making subsequent attempts at endoscopic resection increasingly difficult. In doubtful cases, a second opinion by more experienced endoscopists after review of photographs can confirm the need for a surgical referral. Furthermore, it is recommended that lesions which are located in areas that cannot be identified with certainty by endoscopy, should be marked with carbon black in 3 to 4 quadrants before sending for surgical resection to ensure proper resection (2).

According to ESGE guidelines, proper resection methods of small and diminutive colonic polyps include removal of polyps $\leq$ 3 mm by biopsy forceps and snare polypectomy for larger polyps.

13.Polypectomy retrieval rate

The proportion of non-diminutive polyp (>5mm in size) retrieval should be more than 90 % (3). This is because retrieval of polyps is essential for histopathology which guides further management. Diminutive polyps which are $\leq$ 5 mm in size are associated with a lower risk for CRC (24). Therefore monitoring retrieval rates of polyps more than 5 mm in size are clinically more important. The process of removing larger polyps is technically more difficult (3).

14.Rectal examination and rectal retroflexion

Recording of rectal examination or omission must be achieved in 100% of cases. Furthermore, rectal retroflexion must be done in 90% of cases (25).

Digital rectal examination (DRE) should be performed in a standard endoscopic assessment of the lower gastrointestinal tract to examine the anal canal and lower rectum and also to facilitate the insertion of the endoscope through the anal canal. Several studies have shown an increased rate of detection (up to 8%) of pathology by retroflexion after standard visualisation of the rectum (26).

15. Advanced imaging assessment

The NICE (NBI International Colorectal Endoscopic) Classification is a useful guideline for narrow-band images of colon polyps. The classification uses colour, surface patterns and vascular patterns to distinguish between hyperplastic, adenomatous and malignant polyps (27).

- Type 1 or hyperplastic polyps are characterised by the same or lighter colour compared with the background with white or dark spots of similar size or homogenous absence of surface pattern. Blood vessels may be absent or isolated lacy blood vessels may be seen over the lesion.

- Type 2 or adenomatous polyps are characterized by the brown tinge compared to the background with tubular, oval or branched white surface structures with surrounding brown vessels.

- Type 3 or malignant polyps appear brown to dark brown compared to the background with occasional whiter patchy areas and amorphous or absent surface pattern. They consist of disrupted or missing vessels (27).

The ESGE guidelines described the use of advanced endoscopic imaging for identification and differentiation of neoplasia of the colon in terms of assessment of margin, depth and invasion. (24).

16. Adequacy in the description of polyp morphology

The ESGE guidelines proposed that Paris classification which was developed to standardise the terminology for the morphology of superficial colorectal lesions should be routinely used for describing lesions at colonoscopy (3, 28). However, the minimum standard is not established.

17.Tattooing resection sites

In patients undergoing excision of colorectal lesions with a depressed area (0-IIc) or non-granular or mixed-type laterally spreading tumours, located in areas which cannot be accurately specified during colonoscopy, i.e. from ascending to the sigmoid colon, the part to be resected should undergo tattooing to aid in future identification (3).

Colorectal lesions with a higher risk of cancer often need relocation to detect recurrence and to aid in further treatment. Tattooing is proven to significantly reduce the time taken to re-locate the resection site on colonoscopy (29).

Post-procedure quality indicators

The post-procedure period spans from the time of removal of the endoscope to further management and follow-up.

18. Incidence of perforation and bleeding after polypectomy

Incidence of bowel perforation should be <1:500 and <1:1000 in all examinations and screening colonoscopies respectively. Perforation is recognised as the most serious adverse event in colonoscopy and around 5% have been reported to be fatal (30).

The commonest adverse event following polypectomy is bleeding. The overall frequency of bleeding following polypectomy should be <1% (2, 30). The risk of post-polypectomy bleeding rises with the size of the polyp, proximal colon polyps, anticoagulation and antiplatelets (2). The proportion of successful management of post-polypectomy bleeding without surgery should be more than 90%. In cases of ongoing bleeding, endoscopic therapeutic measures such as re-grasping the stalk of the polyp and holding for 10-15 minutes, applying clips, epinephrine injections and cautery usually result in successful haemostasis. Immediate bleeding after polypectomy is not an adverse event as long as it does not result in transfusions, hospitalization or surgery.

Priority indicators for quality in colonoscopy

The three most important priority indicators are ADR, the use of recommended intervals for repeat colonoscopies and CI rate with photographic documentation. Reaching the recommended standard for each of these parameters is strongly related to clinical outcomes.

Corrective measures for poor performance

The objective in assessing the quality is to identify poor performers and take measures for improvement. When colonoscopists have suboptimal ADRs, steps should be taken to demonstrate improvement. Such measures include improvement of the withdrawal times, using split-dose bowel preparation, education about withdrawal techniques while visualising the proximal sides of mucosal folds, clearing up excess fluid, mucus and faeces while ensuring sufficient colon distension (31).

Conclusion

This review summarises the current expert consensus on performance indicators related to quality in colonoscopy. Adhering to quality measures will help to improve yield while minimising patient harm and make the process cost-effective. Therefore, performing good-quality colonoscopy with proper documentation has become the most essential role of the endoscopist to reduce the incidence and mortality of CRC.

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REVIEW ARTICLE

Current concepts in the management of the axilla in early breast cancer: proposed standard of practice in Sri Lanka

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Keywords: Sentinel lymph node dissection; sentinel lymph node; early breast cancer; axilla

Abstract

Despite breast conservation surgery frequently been done for early breast cancers, mastectomy is still considered as the gold standard in surgical management. However, the management of the axilla has been published following many randomized clinical trials and debated at numerous forums and has gradually become less extensive than the radical axillary clearance done in the past. The reasons are multifactorial and could be attributed for the technological advances in surgery, radiology, systemic therapy and specially radiation therapy. Hence, intense attentiveness on the preoperative status of the axilla has become important in the management of early breast cancer at present.

The global recommendation in managing the axilla for early breast cancer is sentinel lymph node dissection. Currently, with the availability of mammography in most provinces in Sri Lanka, more early cancers with clinically node negative axilla are been detected. Unfortunately, the sentinel lymph node dissection been offered for them are limited, mainly due to the absence of insight on the technique. The current recommendations, and techniques to overcome these recommendations with the limited resources in our country are reviewed in this article.

Introduction

The pathological status of the axilla is considered as one of the major prognostic factors in the management of Breast Cancer. It has been the gold standard to offer level 1 and 2 clearance of the axillary nodes for all stages of breast cancer in the past. Although been documented that over 80% of women who undergo standard axillary lymph node dissection (ALND), have at least one post-operative complication of the arm and psychological distress [1], is still been routinely practiced in many centres in Sri Lanka. As an alternative for ALND, blue dye sentinel node mapping in breast cancer was first published by Guiliano et al in 1994 [2]. Since then numerous randomized clinical trials and multicentre studies have concluded that the Sentinel Lymph Node Dissection (SLND) has supplanted the ALND as the standard approach to the axilla in patients with clinically node negative breast cancer [3-5]. While justifying the use of SLND as the new standard in the assessment of the axilla in clinically node negative patients, use of this method has shown to reduce the postoperative morbidity and long-term complications which were associated with ALND [6].

Indication and contraindications of SLND

Sentinel lymph node (SLN) mapping is not for all patients with Breast Cancer. Early Breast Cancer with clinically node negative axilla is the most important criteria that needs fulfilling to offer SLND. Hence it is an utmost importance and mandatory to assess the axillary status clinically as well as by ultrasound image guided biopsy at triple assessment to select eligible patients for SLND. However, in a systematic review and meta-analysis done to assess the value of preoperative ultrasound-guided axillary lymph node biopsy, only about 50% of women with axillary involvement was identified preoperatively [7]. And one in four women with an ultrasound-guided biopsy "proven" negative axilla were later found positive at SLND [7].

Clinically positive axilla and inflammatory cancer (T4b) are considered as absolute contraindications for SLND, and up to level 2 ALND should be offered in all such instances. However, neoadjuvant chemotherapy (NACT) given for advanced primary of the breast needs be studied individually and the decision on SLND or an ALND should be taken by the multi-disciplinary team. If the axilla was found clinically negative prior to and remains negative following NACT, SLND can be offered, though the sentinel lymph node identification rate (IR) can be low as 89.6 percent with a false negative rate (FNR) high as 14.2 percent [8]. Although the long-term consequences of high FNR have not been studied, the surgeons are advised to perform a meticulous SLND and to obtain more sentinel nodes to minimize the error rate for patients who had NACT.

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Regardless of clinically negative axillae prior to NACT, and if found to have progression of axillary status to be positive while on treatment, warrants a proper level 2 ALND [9].

For patients with clinically involved nodes with or without image guided positive biopsy and remains to be the same following NACT needs proper ALND [9]. But for patients who get converted to clinically node negative stage following NACT, an ALND can be avoided. However, these patients who undergo SLND require more than two sentinel lymph nodes to be sampled to confirm as a negative axilla due to high FNR associated with NACT.

Multicentric disease is not a contraindication for SLND as studies of breast lymphatic drainage indicate that all quadrants of the breast drain into the same lymph node basin [10]. Thus, subareolar and intradermal injection, rather than peritumoural injection of the radio isotope colloid and the blue dye is practical for patients with multicentric disease.

Previous breast surgery for benign diseases or a previous axillary surgery could disrupt or alternate the normal lymphatic drainage of the breast results in increase false negative rates. Although two previous studies have found a feasibility and accuracy of SLND following previous excisional breast biopsies [11, 12], the author has noticed it otherwise. However, there are reports of successful second SLND for local recurrences in the breast and who had breast conservation surgery in the past [13]. Hence due to contradictory arguments on SLND after axillary surgery with possible disruption of the lymphatics a lymphoscintigraphy can be performed to identify the lymphatic drainage prior to SLND.

Lastly, a technically failed SLN detection at any stage of the disease needs a full ALND to fulfil proper axillary treatment.

Validation and technique of SLND

SLND has been developed and validated over a period of three decades. The National Comprehensive Cancer Network (NCCN) guidelines (version 3.2019) essentially recommends an experienced SLN team for the use of mapping and surgical excision. Although there are controversial publications regarding the number of cases required to ensure safety and reasonable low failure and accuracy rates, surgical training requirements and standardization of evidence-based techniques are driving the procedural accuracy to be over 97% and FNR less than 5% [14].

Despite variability in selection criteria and technique, a sentinel lymph node is consistently identified in approximately 96 percent of patients with FNR of 7.3 percent in most studies including the systematic review of 69 trials of SLNB, including 8059 patients. Nevertheless, American Society of Clinical Oncology recommends less than 5% as the acceptable FNR in SLND [15].

Each surgeon needs to identify the best technique to practice following validation of his or her method with the resources available within their institution, which should be adopted from an accepted guideline.

SLND in Sri Lanka

Presently SLND is been practiced in many Teaching / Tertiary hospitals in Sri Lanka though some may not be following the accepted international guidelines. Further there is no proper consensus or an accepted protocol in Sri Lanka other than to follow NCCN guidelines. It is important to realize that the consequences of an invalidated technique or not following accepted guidelines could under stage the axilla and undertreat the patient resulting in poor outcomes.

SLND can be performed with the blue dye, radioactive colloid or with both tracers. Using a combination of blue dye and radioactive colloid resulted in a significantly higher success rate and lower FNR in sentinel node mapping compared with using blue dye alone [16]. In Sri Lanka many centres use only methylene blue to localize the SLN due to lack of resources. The meta-analysis of 18 studies with 1559 patients done by Jiyu Li et al, have reported 91 percent identification rate by methylene blue alone. Hence the authors have concluded by commenting that use of methylene blue alone to localize a sentinel node did not differ substantially when compared with combination method or use of other blue dyes [17]. Unfortunately, the same meta-analysis reported a higher FNR of 13 percent which was far above the accepted false negative rate recommended by the American Society of Clinical Oncologist [15].

Therefore, when methylene blue dye alone is used for SLN mapping, it is recommended attempting to identify more sentinel nodes, removing any hard or large nodes found adjacent to them, only to perform routinely after the technique been validated by the surgeon and selecting patients with smaller tumors.

Comparatively methylene blue has a lower molecular weight (319.85 g/mol) than other commonly used blue dyes (Isosulfan blue 566.7 g/mol, patent blue 582.7 g/mol). Further methylene blue does not have sulfonic acid group in its structure which can combine with amino groups on the protein surface to make a macro particle that get trapped easily within a lymph node [18]. Hence there is always a possibility that methylene blue can escape through the sentinel node and get trapped within the 2nd or the 3rd node in line. This explains why methylene blue SLN mapping gives a higher false negative rate. But use of either 2ml or 5ml of methylene blue alone or the optimal injection site has not shown any

significant difference in the identification rate or the FNR in the meta-analysis done by Jiyu Li.

Isotopes

Medical isotopes are limited only to very few tertiary hospitals in Sri Lanka with constrained supplies of technetium sulfur colloid to localize the sentinel node routinely. Although it is time and money consuming, it overweighs by the advantage of the gamma probe signalling the 'hot' node identifying even through the fat in the axilla. Therefore, it is advisable to use isotopes with the blue dye if facilities are freely available to exploit the advantages of the technology.

Sentinel nodes

Successful sentinel lymph node identification by blue dye is defined as the identification of any 'blue node' or any 'non-blue node' with a blue afferent lymphatic [19]. Hence gentle palpation through the axillary incision should be done once the blue stained lymphatic channels are exposed. It is recommended to remove more than 2 sentinel nodes to minimize the false negative rate (FNR). In NSABP – B32 trial clearly reported that removing 2 sentinel nodes rather than one, reduces the FNR by 50%. Especially when used methylene blue dye alone it is important to follow the blue stain lymphatics and remove the suspicious nodes, closest nodes to the blue stained channels, at least 2 - 3 nodes that are qualified to be sentinel nodes rather than only the 'blue' and 'hot' node to reduce the FNR.

Intraoperative evaluation of sentinel nodes

Intraoperative evaluation of the sentinel node will allow immediate ALND if found positive, and to avert the need of a second surgery. It is understandable that many centres in Sri Lanka where SLND is practiced do not have resources for intraoperative evaluation. Further intraoperative evaluation of sentinel nodes adds time to already tight scheduled theatre hours in many Government / Public sector hospitals in Sri Lanka.

Although several intraoperative techniques can be used to identify a positive sentinel node such as cytology of node imprints [20], cytokeratin staining [21], and/or frozen sections [22], none of these methods will certainly identify all patients with positive nodes intraoperatively because of sampling limitations. While these limitations are considered, meticulous sampling techniques and an experienced pathologist can easily overcome the impact on FNR.

However, evaluation is more accurate on permanent (paraffin) sections which can minimize false negative rates and remains the gold standard. Therefore, the patients must be informed about the possibility of a second operation that may be needed for completion of nodal clearance, if intraoperative evaluation is not possible at their institutions.

Pathology of sentinel nodes

Sentinel node metastases are sub grouped into isolated tumor cell (ITC) clusters, micrometastases and macrometastases depending on the largest contiguous tumour deposit size, determined by routine hematoxylin and eosin stains. Immunohistochemistry staining is not routinely recommended to use in the assessment.

Isolated tumour cell clusters are defines as tumour cells less than 0.2 mm or nonconfluent or nearly confluent cluster of cells not exceeding 200 cells in a single lymph node cross section. ITC clusters are considered as N0 according to the Tumour, Node, and Metastasis (TNM) staging system. Micrometastases are defined when the deposits are more than 0.2mm and less than 2mm within the node and classified as Nmic according to TNM. As both N0 and Nmic do not have any prognostic significance, do not necessitate further surgical treatment to the axilla.

Conclusion

Sentinel lymph node dissection is the gold standard in the management of the axilla for early breast cancers. The recommended and globally accepted guidelines are provided by the National Comprehensive Cancer Network for all surgeons who treat breast cancers to follow evidence-based surgery. Sri Lanka been a country with limited resources, there are many meta-analyses to support techniques to conform to our best practice. As methylene blue dye alone is used at most institutions in Sri Lanka, it is recommended attempting to identify more sentinel nodes, removing any hard or large nodes found adjacent to them, only to perform routinely after the technique been validated by the surgeon and selecting patients with smaller tumors. Any technique not properly validated could hinder the cure rates of an early breast 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.

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IMAGES IN SURGERY

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Case:

A 3-year-old girl presented to the Accident and Emergency unit following a concrete bunk fallen on her anterior chest wall. On examination there was bruising on the anterior chest wall. Within minutes, she started to develop surgical emphysema on the chest wall extending to neck. Nevertheless, she was haemodynamically stable. An anteroposterior chest X-ray of the patient is given in the Figure 1.

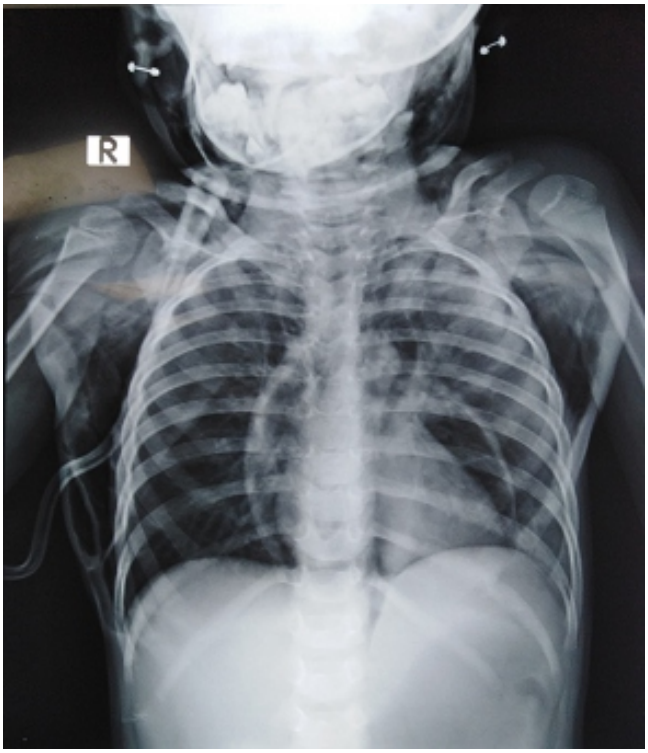

Figure 1. Anteroposterior chest X-ray of the patient

Questions

1. What is the abnormality seen on this X-ray?
2. Which structure is most likely to be injured in this patient?
3. How do you manage this patient?

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Answers on page 44

CASE REPORT

A "never event" in mid-urethral Trans obturator tape (TOT) for stress incontinence

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Keywords: Urinary incontinence; transobturator tape; bladder stone

Introduction

The trans obturator tape (TOT) mid-urethral sling procedure has been a surgical option for women with genuine stress urinary incontinence. However, in certain countries, it has been associated with medical litigation due to its complications. Tape erosion into the bladder with stone formation after a few years is a rare complication.

Case report

A 64-year-old woman with mixed stress and urge incontinence underwent TOT procedure at a gynaecological unit by a trainee with a seemingly uncomplicated procedure and uneventful recovery. She was asymptomatic and after 6 years presented to a urological unit with irritative lower urinary tract symptoms. She also had a recurrence of mixed urinary incontinence for 3 months associated with episodic haematuria devoid of infective features. Her X-ray and ultrasound (US) of KUB revealed an immobile large bladder calculus. (Figure 1) Non-contrast CT-KUB confirmed the diagnosis of an atypical bladder calculus.

Cystoscopy demonstrated a large stone eroding through the lateral bladder wall and extending across the trigon. Ureteric orifices were distorted and displaced. Cystolithotrity exposed a polypropylene mesh which had eroded and protruded through the left lateral bladder wall. Subsequently, the stone was fragmented and the mesh was resected with electrocautery. (Figure 2)

Discussion

Bladder calculi are rare in females and account for 5% of all cases. Presence of foreign bodies within the bladder is a known aetiological factor for vesicolithaisis. Eroded polypropylene tape acting as a nidus has been described during transvaginal tapes (TVT) vertically fixed to the abdominal wall as the needles carrying the tape travel lateral to the bladder wall. However, with the technique of transobturator approach, the tape is placed at the mid-urethral level and the tape is placed more horizontally through the obturator fossa making bladder injury extremely rare in experienced hands. In a meta-analysis of 1854 cases, bladder

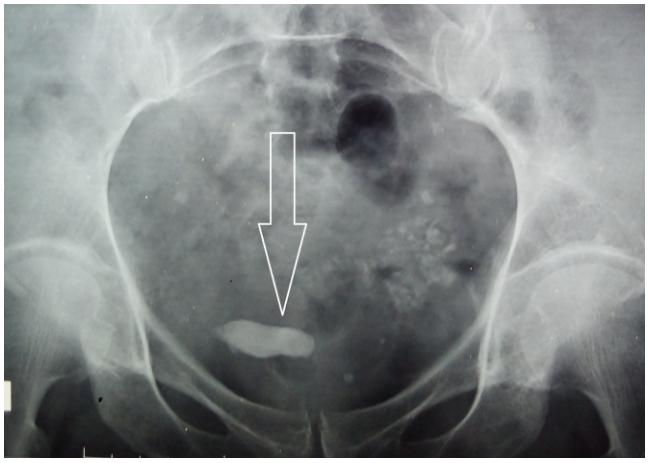

Figure 1. The plain radiograph showing a large bladder stone (white arrow)

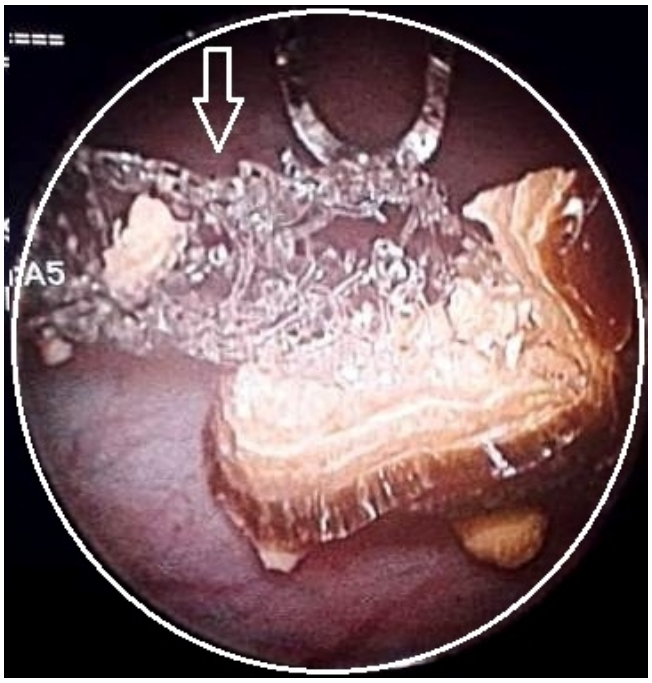

Figure 2. Eroded polypropylene tape (white arrow) surrounded by the stone.

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perforations occurred in 0.2 % during TOT (1). Bladder erosion could occur when the tape is placed more proximally at or above the bladder neck by less experienced operators. The present case is unique in the sense that the patient presented after several years with recurrence of symptoms due to a secondary bladder stone.

It is also important to note that radiological investigations may not help pinpoint the exact aetiology of the stone in this situation.

Endoscopic lithotripsy combined with electro- resection is a successful option for such bladder stones (2, 5). In the presented case the stone was crushed with the pneumatic lithotripter and the mesh resected with electrocautery. Resection of an intravesical portion of the mesh has been recommended in the literature. The Holmium laser would be another option (3). If endoscopic management is not feasible in case of a larger and more adherent stone with a risk of bladder perforation, open vesicolithotomy and bladder repair or even partial cystectomy has been carried out by some authors (4).

While direct perforation of the bladder during TOT compared to TVT during the needle insertion is extremely unlikely due to technical reasons, subsequent mesh erosion is a more likely explanation. The place of cystoscopy at the end of the procedure in cases of suspected bladder injury associated with post-procedure haematuria or bleeding per urethra is well accepted but not recommended routinely following TOT due to the extremely low incidence of bladder injury (5).

The prevention of this complication depends on proper training of the technique of correct TOT tape placement, a high degree of suspicion in bladder perforation especially in TVT procedures associated with pelvic floor prolapse, and prompt cystoscopic confirmation and rerouting of the tape. Tape erosions are prevented by proper anatomical (mid-urethral) placement and avoidance of over dissection of the urethral tissue during urethral exposure.

Conclusion

The TOT procedure can rarely be complicated with tape erosion and subsequent bladder stone formation. In most instances, they can be managed with endoscopic interventions. Proper surgical technique and a high degree of suspicion of bladder injury could prevent this complication.

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.

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Learning Points:

- Formation of bladder stones is extremely rare as a complication of TOT procedure because its anatomical placement, compared to its counterpart TVT.
- Meticulous mid urethral placement of the tape could prevent this complication.
- In most instances this complication can be managed with standard endourological interventions without resorting to open surgery.

CASE REPORT

A rare presentation of recurrent respiratory papillomatosis

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Keywords: Respiratory; papilloma; recurrent papilloatosis; tracheobronchial

Introduction

Recurrent respiratory papillomatosis (RRP) is a rare disease characterized by the presence of multiple papillomata in the respiratory tract. The reported prevalence of RPR among adults is approximately 2 per 100,000 in European populations (1, 2), nevertheless, prevalence data of RRP in Asian populations are sparse. Moreover, RRP is usually a focal entity which predominantly involves the larynx (1). Here, we report a very rare presentation of RRP with diffuse tracheobronchial involvement.

Case Report

A 25-year-old female presented with progressively worsening dry cough, discomfort in the throat and shortness of breath on exertion of six months duration associated with loss of appetite and loss of weight. There was no pyrexia, haemoptysis, odynophagia or wheezes. Apart from mild persistent stridor, the rest of the respiratory system examination was normal, with on air oxygen saturation of 98%. She did not have features of connective tissue disorders, and her genital examination was unremarkable.

Her chest X-ray and Contrast Enhanced Computed Tomography (CECT) of the neck were normal. CECT of the chest revealed nodular thickening of the distal tracheal and main bronchial walls extending to bilateral lobar bronchi suggestive of tracheobronchial papillomatosis (Figure 1). Diffuse papillary lesions extending up to the segmental bronchi were visualized on fibreoptic bronchoscopy (Fig 2).

Guided biopsy of lesions revealed polypoidal mucosal tissue lined by respiratory epithelium with focal squamous metaplasia without evidence of granuloma, dysplasia or carcinoma. The core of the lesion showed moderate infiltration of mixed inflammatory cells suggestive of papilloma. Her serology was positive for Human Papilloma Virus 6 (HPV 6).

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Investigations for immunodeficiency including HIV serology and autoimmune screening were negative. She underwent bronchoscopy guided laser treatment of papilloma three

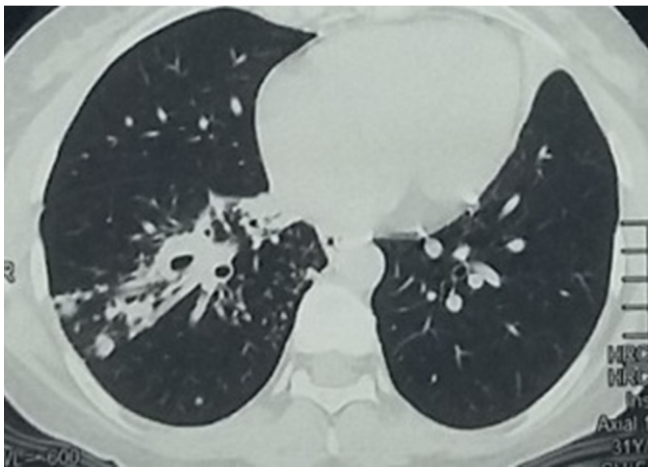

Figure 1. Contrast Enhanced Computed Tomography (CECT) of the chest showing diffuse tracheobronchial papillomatosis.

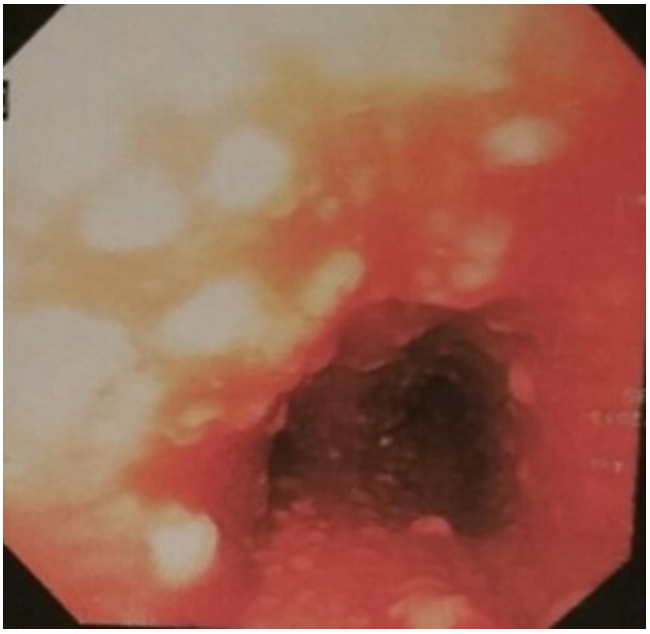

Figure 2. Fibreoptic bronchoscopy showing multiple papillary lesions in a bronchus

times, and due to the recurrent nature of the disease, she was treated with intravenous Cidofovir. She was followed up during the last 12 months at our institution and the last bronchoscopy which was performed four months ago showed no progression of the disease and her symptoms are well-controlled. The management plan is to follow her up at three monthly intervals and redo rigid bronchoscopy and ablation if necessary.

Discussion

RRP is a rare disease caused by HPV. HPV 6 and 11 are the most common aetiological factors in RRP (2), while diffuse and severe involvement of the respiratory tract is associated with HPV 6 (3). Young maternal age (<20 years), presence of genital warts during pregnancy, prolonged delivery, host genetic and immune factors including HLA status are possible risk factors for RRP in children while sexually transmitted HPV is the main risk factor in adults (2).

Clinical presentation of tracheobronchial papillomatosis is often nonspecific. Adults may present with cough, hoarseness of voice, wheezing, exertional dyspnoea and stridor, whereas children usually present with the symptoms of obstructive airway disease (2). Soft stridor may be audible if it involves the glottis (2). The stridor might change with the position of the patient (1). Oral papilloma can be found in 30% of the cases with diffuse RRP (3). Reticulonodular shadows with or without the involvement of the lung parenchyma may be visible on chest X-ray and CT (4). Operative endoscopy guided biopsy is the gold standard of diagnosis (2).

Macroscopically, the lesions are exophytic finger-like projections with a central fibrovascular necrotic core (5). Light microscopy demonstrates a stratified squamous lining in contrast with the pseudostratified columnar ciliated lining in the normal respiratory mucosa (5). The squamociliary junction of the larynx is the commonest site of focal RRP papillomata (1). The diffuse tracheobronchial extension is known to be associated with lung lesions, pneumatocoeles, cavitatory empyema and recurrent pneumonia (4). Though there was diffuse tracheobronchial involvement with papillomata, the lungs were spared in this case.

Debulking surgery while preserving normal anatomy is the treatment of choice (1, 2). Repeated surgeries are often necessary to control the disease due to its recurrent nature (1). CO_2 based laser methods were used initially for debulking. Argon Plasma Coagulation technique and other advanced laser methods were introduced subsequently. Submucosal and microsurgical resection methods are becoming popular since they prevent thermal damage to adjacent structures caused by laser (1). Currently, Argon Plasma Coagulation method and Laser are used in National Hospital for Respiratory Diseases in Sri Lanka.

RRP is considered "severe" when multiple sites of the respiratory tract are involved, four or more surgical interventions are necessary per year and the young onset of disease (1). Patients with severe disease are benefited from adjuvant therapy (2). Recombinant monoclonal antibodies against Vascular Endothelial Growth Factor (VEGF) such as bevacizumab; antivirals such as acyclovir, ribavirin and cidofovir; retinoids and cyclo-oxygenase-2 inhibitors have shown promise in treating severe RRP (2). The majority of "non-severe" cases are stable over time, while others progress or regress despite treatment (3). Periodic screening for the development of bronchogenic squamous cell carcinoma is necessary, especially in adult onset disease (1). Although current treatment modalities are not extremely efficacious in reversing the disease progression, the introduction of HPV vaccination might reduce the prevalence of RRP globally in the future.

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.

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Learning Points:

- Recurrent Respiratory Papillomatosis usually presents with nonspecific respiratory symptoms and a high degree of suspicion is needed for the diagnosis, even if the initial chest X-ray is normal.
- HPV 6 and 11 are the commonest aetiological factors of recurrent respiratory papillomatosis
- Bronchoscopy guided biopsy is the gold standard of diagnosis.
- Periodic screening is necessary for the early detection of bronchogenic squamous cell carcinoma

CASE REPORT

Cutaneous Horns: enigma - Remembering Lady Dimanche

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Keywords: Cutaneous keratin horn; Cornu cutaneum

Introduction

Cutaneous horns are a rare clinical entity, essentially limited to textbooks in today's surgical practice. Image of Lady Dimanche in Bailey and Love textbook of Surgery with a large cutaneous horn over the forehead is an example of such a rare occurrence (1). We hereby report the case of a plantar horn in a retired Indian soldier.

Case Report

This 56 year old male presented to the department of plastic and reconstructive surgery with a history of growth in the medial instep of the right foot for the last 06 years. It was insidious in onset and gradually progressive, painless and did not offer any sort of hindrance to his ambulation. There was no history of systemic disease. General examination was normal with vital parameters well preserved within normal limits.

Local examination revealed 21 mm long, solitary, hard, non-tender curved horn-like lesion at the junction of the hind and midfoot medially extending into the instep region in non-weight-bearing part of the sole. The diameter of the base was 10mm without inflammation or discharge from the lesion. There was no loco-regional lymphadenopathy. He was diagnosed to have a plantar cutaneous horn and was planned for surgical excision. Haematological and biochemical parameters were within normal limits. Per op fluoroscopic image revealed it to be radio translucent horn. It was excised by an elliptical incision and was primarily closed with interrupted sutures in a linear suture closure. Post-op period was uneventful. Histopathological examination revealed skin epidermis with hyperkeratosis, hypergranulosis, mounds of parakeratosis with extensive 'verruciform orthokeratosis'. Dermis shows sparse mononuclear inflammatory infiltrate (Figure 1).

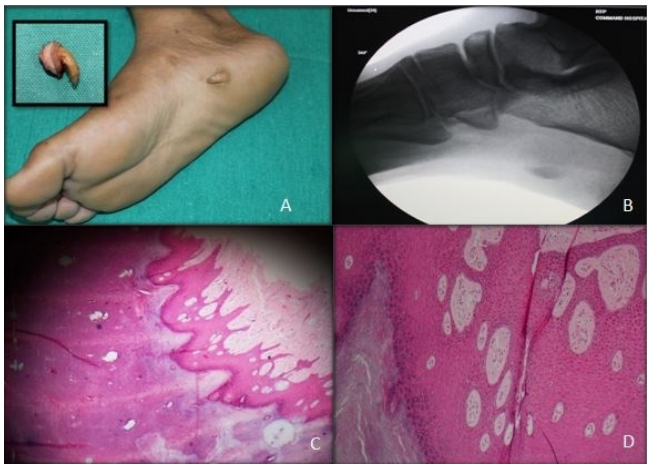

Figure 1. Cornua cutaneum **A**, Lesion before excision and Inset showing Gross photograph after excision **B**, X-ray lateral view showing dense shadow from keratin horn **C**, Low-power view showing skin epidermis with hyper-keratosis, hypergranulosis and extensive verruciform orthokeratosis with dermis showing sparse mononuclear infiltrate. **D**, High-power view demonstrating extensive verruciform orthokeratosis.

Discussion

Image of Dimanche (Madame Dimanche, called Widow Sunday), a French woman living in Paris in the early 19th century, grew a 24.9 cm (9.8") horn in the region of her forehead in six years from the age of 76 before it was successfully removed by French surgeon Br. Joseph Souberbeille (1754–1846). A wax model of her head is on display at the Mütter Museum (The College of Physicians of Philadelphia, US) with long sebaceous horn arising from her forehead and little anecdotes about her and her job, in the first few pages of Bailey and Love textbook of surgery, has fascinated all medical practitioners.

The first case of a cutaneous horn was documented much before Madame Dimanche as early as in the year 1588, wherein pamphlets of Mrs Margaret Gryffith, an elderly Welsh lady, were advertised and she used to be put up as an exhibit for monetary purposes by a businessman. Academic milieu on cutaneous horns in human beings was first given by the Surgeon Everard Home in London in 1791.

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Bondeson gave an overview and historical perspectives regarding cutaneous horns. He described superstitious beliefs prevalent in European population as regards cutaneous horns and how some enterprising individuals made money exhibiting patients with such ailments (3).

Cutaneous horns also are known as 'Cornu cutaneum' in Latin have been enigmatic rare entities, with an incidence of 0.3-1.3% (4). Most of them are seen in fair-skinned individuals because of their increased prevalence and the likelihood of occurrence with sun exposure and actinic keratoses though they are not uncommon in dark-skinned, as sporadic cases have been reported from East Africa, Sudan, Arab and India. These horns are usually of small size but at times they can attain large size. J W Gould described its association with verruca Vulgaris (5). Cutaneous Horns can occur in any part of the body but more than 30% are seen in the head and neck region. These lesions were found both on sun-exposed areas like forehead, hand, eyelids, scalp and trunk. They are also reported on non-sun exposed areas like the penis, lacrimal sac, nasal vestibule and sole. (6).

Cutaneous horns are well-circumscribed, conical projections formed of densely laid adherent keratin. They are hyperkeratotic, owing to the hyperproliferation of basal keratinocytes with compactly layered keratin mimicking a horn. Risk factors for progression to malignancy are male sex, advanced age, sun-exposed surface, and more height to base ratio along with pain and perilesional skin changes.

The association of cutaneous horn with malignant or premalignant potential is found to be around 20-38.9% with squamous cell carcinoma being the most common histopathological variant owing to their increased association with keratin formation (4, 7). Pathogenesis is unclear but they generally arise in the backdrop of actinic keratoses which is a known precursor of squamous cell carcinoma. Underlying lesions can be benign (benign nevus, pyogenic granuloma, seborrheic keratoses, lichen simplex, etc.), premalignant (leukoplakia, kerato-acanthoma, actinic keratoses etc.) or malignant (squamous cell carcinoma, basal cell carcinoma, Bowen's disease, Kaposi sarcoma and melanoma, etc.) (8).

E Copcu et substantiated their association with dermatological ailments like solar keratoses, actinic keratoses, kerato-acanthoma, squamous cell carcinoma and basal cell carcinoma and increased likelihood of horns occurring in sun-exposed areas (7). Peter M Nthumba described a giant cutaneous horn in hypopigmented burn scar of more than 20 years duration in a black African lady, nicely concealed by scalp hairs, comprehensively ruling out the possibility of Marjolin's ulcer (9). Olugbenga et al described cutaneous horn in the sole for the first time in the literature in 2011 in a black African lady (2). Ramji et al gave an account of cutaneous horn in yet another sun-protected area in the volar aspect of the forearm with evidence of basal cell carcinoma at its base (10).

While dealing with cutaneous horns, it is necessary to rule out an association with malignant lesions. Our patient's histopathology revealed it to be keratin horn with no evidence of malignancy. He did not show any evidence of recurrence in one year of follow up.

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.

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Learning Points:

- Cutaneous horns are rare entities normally seen in sun-exposed areas of the body.
- They can also be found in sun protected areas like the sole of foot and penis.
- They can be associated with benign, premalignant and malignant lesions.
- It is imperative to suspect and rule out malignancy in all cases of cutaneous horns.

Answers to images in surgery (from page 36)

1. The chest X-ray shows a simple pneumomediastinum and pneumopericardium with air trapped in the pericardium and tracking along the medial border of the aorta. Blunt and penetrating chest trauma are the commonest aetiological factors, whereas respiratory diseases may also give rise to this condition (1, 2). Subcutaneous emphysema over the anterior chest wall extending to the neck is found to be commonly associated with pneumomediastinum (2) which is also demonstrated in the X-ray. Tension pneumoperi-cardium and tension pneumothorax are life threatening conditions characterized by haemodynamic instability. Nonetheless our patient was haemodynamically stable.

2. Injury to the airway is the commonest reason for the occurrence of concomitant pneumomediastinum and pneumopericardium, and unless diagnosed early it may contribute to a significant mortality (3). Our patient had a carinal injury extending to the right bronchus which was detected on the subsequent CECT chest. Pneumomediastinum occurs when air leaks into the mediastinum via the ruptured peribronchial sheath whereas pneumoperi-cardium results in when the air enters the pericardium through the concomitantly damaged perivascular sheath (2). However, oesophageal and bowel injuries are also associated with pneumomediastinum (2, 3).

3. The initial step of management is to carefully assess the airway, breathing and circulation and to stabilize the patient if there is any haemodynamic compromise while simultaneously liaising with the thoracic surgical team. Pericardial aspiration should be performed if there is evidence of tension pneumopericardium leading to cardiac tamponade (4). CECT chest and bronchoscopy will aid in localizing the injured site. Upper gastrointestinal endoscopy should be performed if an oesophageal injury is suspected. The majority of the cases with simple pneumomediastinum and pneumopericardium can be managed conservatively with careful monitoring given that there is no significant underlying pathology (1). However, if an airway injury is found it needs to be repaired surgically. This patient underwent a right thoracotomy and the tear was repaired with a pericardial patch. She had an uneventful recovery following the surgery.

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.

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CASE REPORT

Primary Ewing's sarcoma of the kidney presenting with left-sided varicocele

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Keywords: Ewing sarcoma; kidney; varicocele; neoplasm

Introduction

Ewing's sarcoma is a primary malignant bone tumour of neuroectodermal origin accounting for the second commonest paediatric bone sarcoma (1). However, its involvement of the urinary tract as primary renal neoplasms is extremely rare, representing less than 1% of renal tumours (2). We present a case of primary Ewing's sarcoma of the kidney presenting with left-sided varicocele.

Case Report

A 24-year-old male presented with a left-sided scrotal lump of four years duration. Examination revealed a left-sided varicocele associated with an ill-defined mass in the left hypochondrium. On further questioning, the patient complained of left-sided intermittent flank pain, however, there were no significant urinary or systemic symptoms. Complete blood count, renal functions and erythrocyte sedimentation rate (ESR) were within normal ranges. Ultrasound scan showed a left-sided varicocele and a left-sided renal mass. Contrast-enhanced computed tomography (CECT) of the abdomen (Figure 1) revealed a left renal neoplasm compressing the vascular pedicle and para-aortic lymphadenopathy. The patient underwent left-sided radical nephrectomy. Left kidney, proximal ureter, left adrenal gland and an attached bowel mass containing distal ileum, caecum, large intestine and proximal sigmoid colon were removed during surgery.

Macroscopic examination revealed a mass measuring 150 x 95 x 90 mm mainly in the hilar region focally extending up to renal capsule and perinephric fat, replacing the normal renal parenchyma. Intestines were free of tumour invasion. Microscopy revealed a small round blue cell tumour with extensive necrotic area composed of solid sheets and nests of cells with hyperchromatic rounded to oval nuclei with scanty cytoplasm (Figure 2). Frequent mitotic figures, pseudorosette formation and microvascular invasion were seen. Adrenal

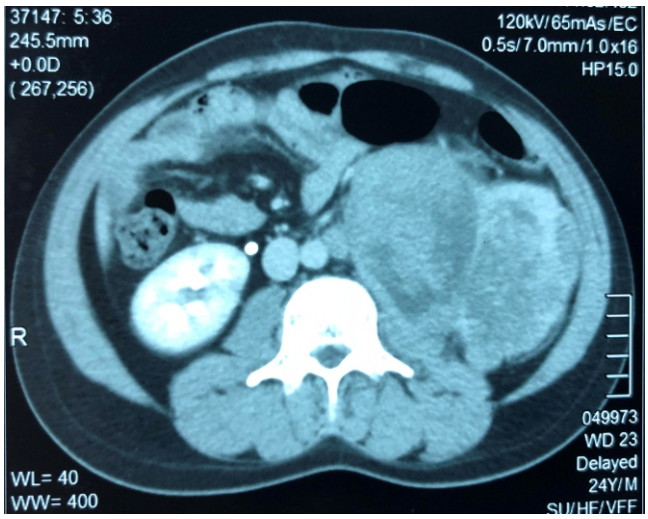

Figure 1. Contrast Enhanced Computed Tomogram (CECT) showing a left renal neoplasm compressing the vascular pedicle and para-aortic lymphadenopathy

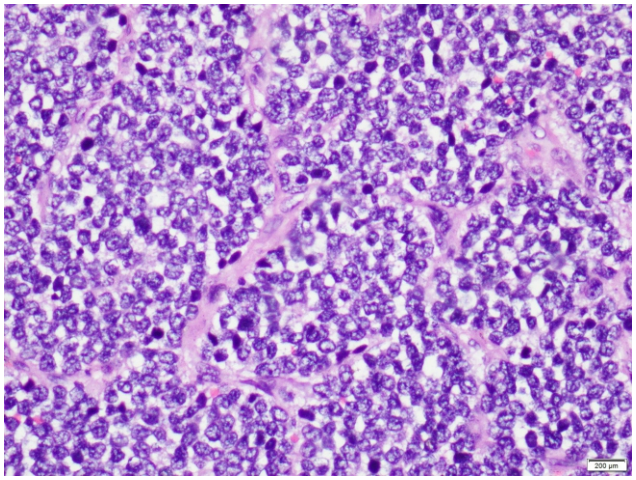

Figure 2. Haematoxylin and Eosin stain of the tumour showing sheets of small round blue cells with scant cytoplasm (40x magnification)

gland showed tumour emboli within vessels. Peri hilar region did not reveal lymph nodes. On immunohistochemistry, the tumour was negative for leukocyte common antigen (LCA), terminal deoxynucleotidyl transferase (TdT), pan-cytokeratin, WT1, Desmin, chromogranin and cluster differentiation 56 (CD56) excluding the possibility of a lymphoma and Wilms tumour. Immune-morphological features were of an Ewing's sarcoma (Figure 3). After surgery

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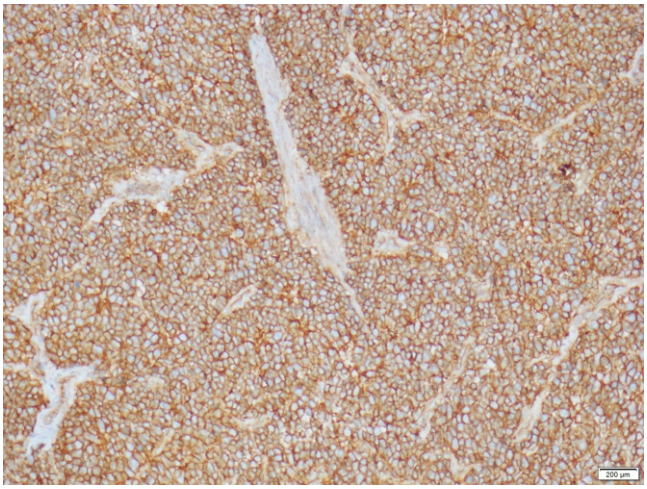

Figure 3. CD99 Immunohistochemical staining showing diffuse membrane positivity in tumour cells (20x magnification)

patient was referred to the National Cancer Institute for adjuvant chemoradiotherapy.

Discussion

Primary Ewing's sarcoma of the kidney is a rare entity associated with poor clinical outcomes (1). As in our case, it mainly affects young males at a median age of 28 years (1). Patients with primary renal Ewing's sarcomas commonly present with pain, haematuria and renal masses while a minority present with constitutional symptoms such as fatigue or loss of appetite (1, 2). In a case series, one-third of patients had metastasis at the time of diagnosis and 40% developed metastasis shortly after surgery (2). Commonest metastatic sites were lung (60%), liver (37%) abdominal lymph nodes (20%) and bones (16%) (2).

CECT may show large masses with necrotic, haemorrhagic and occasionally calcified areas but fails to provide any specific signs (3). Diagnosis is confirmed after histological and immunohistochemical analysis of surgical specimens (3). Microscopy comprises sheets of uniform small round cells with Homer-Wright rosettes positive for CD99 (4).

Ewing's Sarcoma is associated with translocations causing fusion of the EWS gene on 22q12 with a member of E26 Transformation Specific (ETS) family of transcription factors (1, 2). These fusion genes can be detected by fluorescent in-situ hybridization (FISH) techniques and are used as diagnostic markers in specialised centres.

Due to the rarity of this condition, specific treatment methods are not well established. Most of the cases are treated with radical nephrectomy with neoadjuvant and adjuvant chemoradiotherapy (5). Chemoradiotherapy has demonstrated significant survival benefits and improvement of symptoms even in patients with metastatic disease (1).

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.

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Learning Points:

- Primary Ewing's Sarcoma of the kidney is a very rare entity.
- It commonly affects young males.
- Diagnosis is primarily by histological, immunohistochemical stains and genetic testing.
- Nephrectomy with neoadjuvant and adjuvant chemoradiotherapy is the preferred method of treatment.

CASE STUDY

Poland syndrome associated with contralateral gynecomastia

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Keywords: Gynaecomastia; poland syndrome; syndactyly

Introduction

Poland syndrome is an uncommon congenital birth defect that may present with partial or complete absence of the pectoralis muscle. It is commonly accompanied by nipple-areolar complex, breast abnormalities, thinning of subcutaneous tissue, deformities of ribs, axillary and pectoral hair absence, and unilateral hand syndactyly. Some of these anomalies present at puberty. Out of these, the chest may become more apparent. However, severely affected children could have these anomalies in hand or chest from birth.

Case Report

This seventeen-year-old male presented with a complaint of left side breast enlargement for 2 years' duration. At the age of 2 years, parents noticed his chest wall is not symmetrical, so they sought medical advice and were reassured. Since he was 15 years old, they have noticed a rapid enlargement in his left breast. The patient is non-alcoholic, non-smoker with no history of medication, liver disease, renal disease, or any traumatic injury.

On examination the patient is obese, the thyroid is diffusely enlarged. He has right-sided syndactyly affecting right ring and middle fingers. On local examination, the right nipple and areola complex was smaller and was at a superior position. Moreover, there was no nipple discharge on the left side. On palpation, the abdomen was normal. Both testes were palpable in the scrotal sac and they were normal in size and volume.

Laboratory Investigations:

AFP	**– 6.79 micg/dL (<8.5)**
Testosterone	**– 9.20 nmol/L (9.7 - 38.14)**
FBS	**– 67.2 mg/dL**
Total Cholesterol	**– 283 mg/dL**
TG	**– 122.4 g/dL**
HDL	**– 46.4 mg/dL**
LDL	**– 212 mg/dL**
C: H R	**– 6**
Beta HCG	**<1.2 mIU /ml**
FSH	**– 2.06 mIU/ml (0.7-11.1)**
LH	**– 4.76 mIU/ml (0.8-7.6)**
TSH	**– 2.92 IU/ml (0.4 -4.0)**
T4	**– 1.44 ng/dL (0.89-1.76)**

Patient underwent liposuction with nipple preserving gynecomastia correction surgery.

Discussion

Gynecomastia is commonly defined as a benign excessive development of breast tissues in a male. There are four grades of gynecomastia (6);

Classification

The causes for this condition are physiological causes such as puberty, certain medications, liver diseases, starvation, hypogonadism, certain tumours like prolactin-secreting pituitary adenomas, hyperthyroidism and certain syndromes like Klinefelter syndrome (6). Poland syndrome is quite an uncommon condition encountered in surgical practice which is estimated to occur in 1 in 30 000 patients. The right side of the chest is affected twice as often as the left. In this condition, no gender predilection is exhibited (4).

Grade I	Minimal hypertrophy (<250g of breast tissue) without ptosis I A. Primarily glandular I B. Primarily fibrous
Grade II	Moderate hypertrophy (250-500 g of breast tissue) without ptosis II A. Primarily glandular II B. Primarily fibrous
Grade III	Severe hypertrophy (> 500g of breast tissue) with grade I ptosis Glandular or Fibrous
Grade IV	Severe hypertrophy with grade II or III ptosis Glandular or fibrous

Anomaly in vascular developmental sequence during the 6th week of intrauterine life along with hypoplastic of the subclavian artery is believed to be the aetiology which causes musculoskeletal malformations (4).

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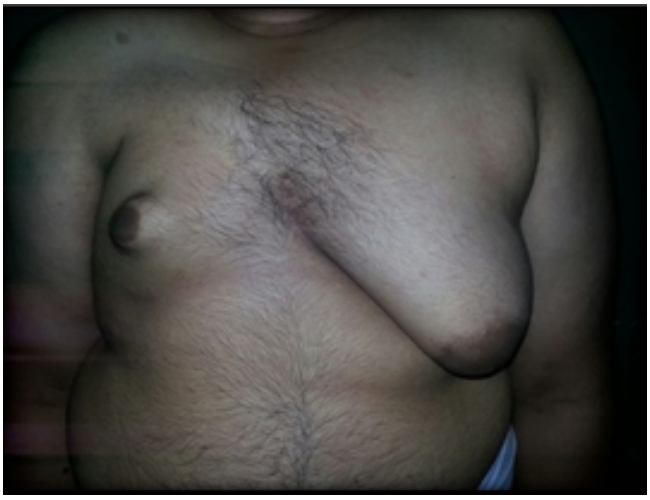

Figure 1. Before Surgery – marked chest wall asymmetry

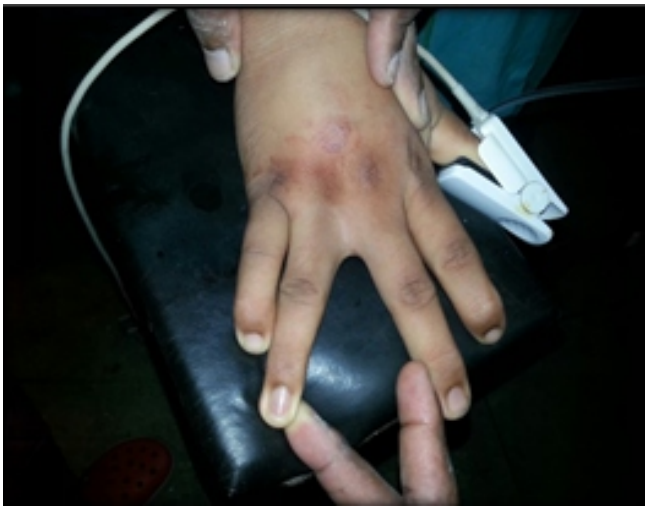

Figure 2. R/S partial syndactyly

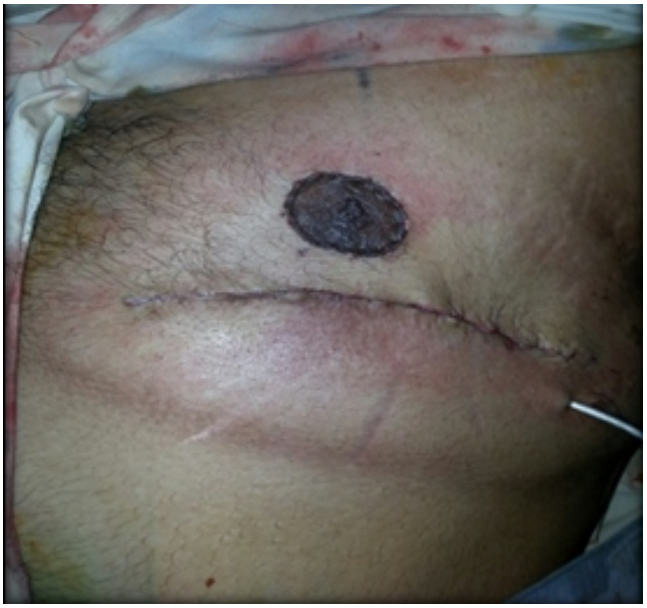

Figure 3. After Surgery

The chest wall in a severely affected individual will have a hairless chest with thinned out subcutaneous tissues with smaller or rudimentary nipple and areolar complex. Underlying ribs may be smaller and deformed. The combined length of the affected upper limb is shorter due to arm, forearm wrist hand shortening. Other finger anomalies are syndactyly or webbed fingers and shorter fingers. The small bone union may lead to what is known as symphalangism. More severe cases may have deficient thoracic muscles (serratus, external oblique, pectoralis minor, latissimus dorsi, infraspinatus and supraspinatus muscles). The lung may also herniate due to hypoplastic or absent anterior ribs (4).

Poland syndrome affected cases are sporadic in occurrence. However, some rare cases show autosomal dominant inheritance pattern. The responsible genes are yet to be determined (5). Management depends on the severity of deformities. In minor chest wall asymmetry, permanent tissue expanders can be used. In severe cases with no underlying rib anomalies can have lattisimus dorsi flap reconstruction. However, if severe, associated rib abnormalities may need to be treated to optimize the eventual outcome (4).

This case was managed surgically to correct the gynecomastia first and lipofilling of the Poland syndrome side subsequently. Although the implant is indicated to improve the cosmesis his poor glycaemic control and obesity precluded from us to embark on this at this point of time.

The surgical reconstruction was complex since the patient wanted to preserve the nipple-areolar complex. What we is a modified version of the wise pattern technique. The only difference is that the nipple-areolar complex is kept on inferiority based pedicle and brought on to the skin through the skin similar to a buttonhole opening to match the future nipple level. This is placed at a similar point in the fourth intercostal space. This is done as the hypoplastic NAC is expected to be moved with the reconstruction of that side. Pre-op and the post-operative photos are provided.

Conclusion

The occurrence of Poland syndrome with contralateral gynecomastia is extremely rare. Satisfactory results for gynecomastia can be achieved by liposuction and nipple-sparing gynecomastia correction surgery.

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.

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Learning Points:

- Poland syndrome is rare but needs to be excluded in patients with congenital hand problems.
- Gynaecomastia correction in grade 4 disease may need to employ techniques used in reduction mammoplasty.

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