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- Endoscopic evaluation of patients with dyspepsia
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An Effective Human Fibrin Sealant

- Lesser duration of surgery, better tissue stability and reduced postoperative swelling.
- Adjunctive use expedites the healing process resulting in faster recovery.
- Could be useful in preventing leaks and promoting healing of "high-risk" anastomosis.
- May influence tissue remodelling, which may help to alter postoperative adhesion development.
- Significantly reduces postsurgical wound drainage.
- Tisseel is benign with respect to acute interactions with the human brain and spinal cord.
- Less significant granulomatous inflammation, better overall axonal regeneration, fiber alignment and recovery of nerve conduction velocities post peripheral nerve repair.
- Most common tissue adhesive agent, nonsuture primary or augmenting method of nerve repair.
- Cerebrospinal fluid leakage in spinal surgeries can increase the length of hospitalization. Use of Tisseel reduces the incidence of postoperative CSF leaks.

References:

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Lanka Hospitals surgical model expands to international standards

Lanka Hospitals, the multi award-winning internationally accredited hospital located in the heart of Colombo is fortified with the most technologically advanced equipment and a well-respected bevy of consultants and medical staff with international exposure and experience. With its recent quality addition; The Joint Commission International (USA) Lanka Hospitals is duly bestowed with the epithet ‘The most accredited hospital in Sri Lanka’. The JCI is yet another mark of its continuous quality, sustained delivery of maximum patient safety and superior care.

Holding true to its international standards, Lanka Hospitals through the years has amassed a wealth of technical expertise, and resources in relation to surgical care complimenting with its tertiary care facilities; so that patients can undergo all medical procedures under one roof.

Lanka Hospitals is one of the few healthcare providers in Sri Lanka to undertake surgical care for patients of all ages from pediatric to geriatric. The hospital specializes in procedures from conventional to minimal invasive and offers all major surgical spectrums from Neurosurgical (spinal and brain) Orthopedic (TKR, Hip replacements, acute poly trauma), general and GE surgery (Laparotomies, liver resections, thyroidectomies, wheeple, APRs) to Pediatric, Oncology surgeries, Cardiac, ENT, OMF and Cosmetic.

The 27-bed surgical unit established on the 8th floor of the hospital has shown a tremendous growth since its commissioning last year and is currently being patronized by eminent surgeons in their fields of specialty. The dedicated surgical ward is facilitated by a 4-bed High Dependency Unit (HDU).

All Operating theaters have been consistently upgraded with modern cutting edge technology and instrumentation to facilitate the surgeons and for the safety of the patients. With Lanka Hospitals focusing on Day Care surgeries, emergency mini theatre of the hospital is being upgraded to suit a broader spectrum of surgeries.

Lanka Hospitals surgical care, on par with international quality standards is complete with some of the latest technological additions since 2013/2014.

- 2 high end laparoscopic systems: Karl Storz and the latest Olympus systems. Since this upgrade, the hospital has seen a 100% growth in laparoscopic surgeries.
- Urology: Laser system has been upgraded to 30 Watt, while the Olympus Resectoscope is being upgraded to the latest edition.
- Neurology: the hospital possesses Sri Lanka’s first Neuro navigation system with 3DC arm for precision and efficiency. Since the introduction of this system, there has been a 250% increase in brain surgeries and no post-operative neurosurgical mortalities in Lanka Hospitals.
- Neurology: Procurement of latest Budde Halo Neuro Retractor system for ease of performance and precision. Lanka Hospitals is also the only private hospital in the country that has a 6-member- strong mix
of visiting and resident consultant neuro surgeons to attend to neuro surgeries around the clock within
the premises.
- the latest self-retaining abdominal retractor systems
- the latest ultra sound scan with intra operative probes for liver surgeries
- ultrasonic dissector system

GE Center: Lanka Hospitals performs liver surgeries every month and the imminent commissioning of the
Gastroenterology Center of Excellence will see the establishment of a dedicated GE facility with multiple
subspecialties. The GE Center of Lanka Hospitals will encompass diagnostic and therapeutic procedures under one
single facility and will be unprecedented in its technology and expertise with additions such as

- Endoscopic Ultrasonic Scan (EUS)
- facilities to perform procedures such as Endoscopic Retrograde Cholangiopancreatography in the
  same facility without shifting to Operation theaters
- PH Manometry with impedance studies

Surgeon resources as Lanka Hospitals are one of the best in the country, largely due to the unique mix of resident as
well as visiting surgeons. Lanka Hospitals portfolio of ‘best in class’ surgeons and consultants places it as the
undisputed choice for surgical care amongst patients. Surgical staff is trained and transformed to be the best surgical
care team in the country. Specialized training is given for all levels of care providers with a view to enhance expertise
in specialist pre and postoperative care.

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# The Sri Lanka Journal of Surgery

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2D mammography and breast cancer screening: a global and local perspective

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Key words: Breast screening; digital mammography; Sri Lanka

Introduction

Radiological imaging plays a pivotal role in early detection of breast cancer. The basic two view mammography (craniocaudal and mediolateral oblique views - CC and MLO) has been the traditional tool in screening for breast cancer. Nevertheless, an overall 15 - 30% of breast cancer is not diagnosed by routine mammographic screening [1]. In the subgroup of women with dense breasts, this percentage is even higher [1, 2, 3, 4]. Hence, several new advances have emerged in the field of breast imaging with prospects for improving early detection of breast cancer.

Conventional analogue mammography (film) is being replaced by high technology digital mammography (digital) worldwide. The trend to invest in digital mode is now seen in lower middle-income countries like Sri Lanka as well.

The digital mode has further evolved to introduce new advances to breast imaging such as digital breast tomosynthesis (DBT) which allows the breast to be imaged in thin cross sections, reducing the burden of tissue overlap. 2D synthetic mammography is another high-tech development in DBT promising to reduce the burden of radiation in DBT and 2D combined protocols.

Parallel to the technological advances in mammography, the guidelines for mammographic breast screening has evolved in keeping with evidence mostly from nationwide breast screening programmes. Professional bodies, authorities and consensus groups of different countries have tabled age and interval recommendations for mammographic breast screening catering to target populations of their countries.

Although the breast is amenable to imaging by a number of imaging modalities ranging from conventional 2D mammography and ultrasound scan (USS) to tomosynthesis and magnetic resonance imaging (MRI), not all imaging modalities are recognized as routine screening tools for breast cancer. The role of digital breast tomosynthesis, 2D synthetic mammography and adjunct breast imaging modalities such as USS and MRI in breast cancer screening will be discussed in a subsequent paper.

Mammography

Mammography is indicated both for screening of breast cancer and for further assessment of otherwise detected breast pathology.

In countries with well-established breast screening programmes, women are individually invited for routine screening at regular intervals and are methodically followed up either by routine recall or by recall for further assessment of screening-detected significant abnormalities. Assessment may involve further mammographic views, breast USS and image-guided tissue sampling followed by referral for further care and follow up. Such systematic screening programs include professional and methodical delivery of results to the identified parties as well as organised data collection, regular monitoring and evaluation of the screening programme, and an authorised body responsible for delivery of care, maintenance and upgrading of service quality [5].

Benefits of mammographic breast screening

Mammographic breast screening has been historically valued as a versatile programme to reduce mortality from breast cancer due to its ability for early detection of malignancy when cancer is still at a curable stage [6]. Benefits of mammographic breast screening vary for different age groups.
The benefits of a screening mammography for the 50 to 59 year age group has been most clearly stated in terms of relative reduction of mortality from breast cancer. Figures for overall mortality reduction are 15 - 20% for this age group [7, 8]. Furthermore, the International Agency for Research on Cancer (IARC) workgroup on breast cancer (2014) reports even higher figures for reduction in risk of mortality due to breast cancer for the 50-59 year age group who actually participated in the screening programme. Their published figures reach 40% for those women who actually participated in a screening programme as compared to 23% observed in women who were invited for screening in the same age group [5]. Mammographic screening is reported to reduce mortality from breast cancer in the 60 to 69 year age group as well [5, 7, 9]. There was debate on the efficacy of mortality reduction for the 70 to 74 year age group, but there is sufficient evidence that the screening mammography reduces mortality from breast cancer in this age group as well [5, 10].

Unlike for the 50 to 74 year age group, there is much debate on the adequacy of global evidence for younger women, particularly of the 40-49 year age group. Mortality reduction data for the 39 to 49 year age group was revised in a meta-analysis of 8 trials by Nelson HD et al for a report on The Systematic Evidence Review Update for the U.S. Preventive Services Task Force (USPSTF) - 2009. It reported benefits similar to the 50 - 59 year age group (relative risk [RR] 0.85; 95% credible interval [CrI], 0.75–0.96; 8 trials) [7, 9]. However, The IARC workgroup on breast cancer (2014) concludes that there is only limited evidence for significant reduction of mortality from breast cancer detected by mammographic screening for the 40 - 44 year age group. Similarly, there is limited evidence of mortality reduction for the 45 to 49 year age group as well. Nevertheless, it is interesting to note that the IARC report notes that even though the majority vote was for limited evidence, there was almost equal voting amongst voting members for sufficient evidence in mortality reduction for the 45 - 49 year age group [5].

However, even though there is sufficient evidence that the benefits of mammographic breast screening substantially outweighs the risk of incurring radiation-induced breast cancer due to mammographic breast screening in the 50 - 74 year age group of the population, similar evidence is not clear for the younger 40 - 49 year age group [5].

Disadvantages of screening mammography - over diagnosis

In addition to the widely accepted advantages, mammographic breast screening has recognised disadvantages such as over diagnosis, false positive outcomes and radiation caused breast malignancy [5]. The issue of over diagnosis has recently become a widely discussed topic. Mammography detects occult malignancies which may never have surfaced in a woman's life time if not for screening. In the absence of clear markers to identify life-threatening screening-detected malignancies from cancer that would not surface clinically, or cancer which would not become life-threatening during a woman's life time, all cancers are treated and therefore the latter group of women will experience only the risks and side effects of treatment [8]. Hence, over diagnosis creates great physical and psychological burdens on the affected women as well as an additional cost to the financial burden of population screening. These disadvantages need to be weighed against mortality reduction and the other benefits of mammographic screening.

The viewpoint of the IARC working group on breast cancer screening (2014) is that currently there is sufficient evidence to conclude that mammographic screening leads to over diagnosis of breast cancer [5]. However, in a Swedish randomized trial report, Duffy et al found that the benefits of mammographic screening in terms of lives saved largely outweighs the harm that may occur due to over diagnosis. The trial further concludes that there are an additional 2 - 2.5 lives saved for every over diagnosed case [11].

Target age group for screening and routine screening interval

In addition to evidence on mortality reduction, population specific data on the age group related incidence of breast cancer, peak incidence age group, financial benefit from life years saved and other public health directives of a given country are considered when age and interval recommendations are decided in a screening programme.

The target age groups for mammographic breast screening and the recommended routine screening interval varies amongst different countries [Table 1].
In USA, the majority of professional bodies and consensus groups including the American Cancer Society, the National Cancer Institute, the American College of Radiology and the American College of Surgeons, recommend 40 years as the recruitment age for a screening mammography with an interval of 1 - 2 years [12]. These wide recommendations are challenged by the 2009 USPSTF report which is authored by a group of healthcare professionals making recommendations for preventative care after reviewing the current scientific literature [7, 9]. They recommend 50 years as the starting age for screening with 2 years as the screening interval [13]. Their recommendations against regularly inviting women for screening mammography before the age of 50 has sparked an ongoing debate about breast screening practices and guidelines in the US [12, 14]. The IARC work group reports that currently there is insufficient data to confirm a most appropriate screening interval [5].

**Advances in 2D mammography - digital mode**

Traditionally mammographic screening was carried on a screen film mode (film). With the introduction of digital mammography (digital), the global trend has been to convert breast imaging units to a digital mode.

**Is digital mammography better than film mammography?**

Nelson et al (2009) indicated in their report that as the available population studies are based on film mammography there is no published work using digital mammography to assess the efficacy of digital mammographic breast screening. They raised concern on converting to an expensive digital mode purely on an assumption that newer technology is better without valid scientific evidence of its efficacy. They also suggested the possibility of increased false positive results with the digital mode [7, 9].

Nevertheless, the screening and diagnostic trial to compare the effectiveness of two types of mammography in detecting breast cancer in women, a multicentre study conducted by Pisano et al (2001) in Canada and USA, has a number of publications on the performance and efficacy of the digital mode. Their Digital Mammographic Imaging Screening Trial (DMIST) group studied the diagnostic accuracy of digital mammography in screening of breast cancer in comparison to film mammography in 49528 women. They concluded that both modalities are of equal efficacy for the entire population, but digital mammography is significantly more accurate for women under 50 years, for women with mammographically dense breasts, and for peri- and postmenopausal women [15].

It was later concluded that the claimed better sensitivity of the digital mode in DMIST actually applies only for the limited subgroup of pre or peri-menopausal women under 50 years of age who have mammographically dense breasts. For all other sub groups, there was no statistically significant difference between the diagnostic accuracy of digital and film mammography. In fact, film mammography has better, but statistically non-significant sensitivity in women with fatty breasts aged 65 years or more [16].

The cost of digital mammography needs to be borne by stakeholders, which could be a ‘free’ national health system, personal cost to the patient or health insurance. The cost effectiveness of digital mammography was analysed by Tosteson A et al based on the findings of DMIST. They concluded that targeted digital imaging is
cost effective, whilst offering film to all or offering
digital to all women in the screening population is not.
Targeted digital imaging is referred to age-targeted
digital imaging where this form of imaging is offered to
women <50 years of age. Tosteson et al also highlighted
that the shift from conventional film to the more
expensive digital imaging can be considered as
beneficial for young (<50 year old) females at the
expense of older (>65 year old) women with fatty breasts
who may actually benefit more from film
mammography. They recommend offering age targeted
digital imaging as the most efficient approach for breast
screening in USA [17, 18].

Mammographic Breast Screening in Sri Lanka
The National Health System of Sri Lanka and the private
sector currently offers opportunistic mammographic
breast screening for women on request. The National
Cancer Control Programme recommends a screening
mammography to be offered for the 50 – 69 year age
group with a routine screening interval of 2 years [19].

Availability of equipment
Both the national health sector and the private sector
cater for breast imaging in Sri Lanka. Only film
mammography was available in both sectors until
recently, but the trend to convert to digital mode has been
observed in Sri Lanka both in the government and
private sector. Digital mammography is now available in
the national health sector as well, starting at the National
Hospital of Sri Lanka. DBT is currently only available in
the private sector. Synthetic mammography facilities are
not available in either sector.

The distribution of the imaging units is not uniform and
more than 50% of mammography machines are
clustered in the western province in and around
Colombo [19]. Introducing mobile screening units
which can reach targets in the periphery on a pre-
selected annual date may provide wider coverage for
screening in Sri Lanka. Such mobile breast screening
units are incorporated in to screening programmes both
in developed and developing countries such as India.

Evidence based practice
The unavailability of a nation-wide mammographic
breast screening programme with monitoring and
evaluation of screening practices, and the lack of
awareness/agreement of current guidelines may lead to
varying opportunistic screening practices both in the
national health sector and in the private sector.

Considering the limited local resources, newer
technology can be offered selectively on an individual
basis with the presence of medical evidence. Offering
digital screening mammography to the subgroup of
women who are <50 years, premenopausal and with
dense breasts is such an exemplary situation that would
concur with evidence [16, 17, 18]. Also, in the private
sector where availability leads to routine offering of
combined DBT and 2D mammography for screening
purposes, the universal risk vs. benefit principle needs to
be considered. The burden of cost, over diagnosis and
additional radiation to healthy women needs to be
weighed against the proven increased cancer detection
rates from these combined modalities when determining
the screening age group and the screening interval.

Formulation and regular updating of evidence based
guidelines acceptable to Sri Lanka is a current local
need. Such guidelines need to be discussed in a bigger
forum and should be accepted within the government
and private health sectors for breast screening.
Professional bodies concerning relevant disciplines
such as surgery, oncology, radiology, pathology, public
and community health sectors, and health administrators
have a responsibility to initiate such discussion.

Does Sri Lanka need a National Breast Cancer
Screening Programme?
The suitability of nationwide breast screening
programmes for low and middle income countries has
currently become a controversy. Cost effectiveness is
considered a major determinant in this regard where cost
of a national breast cancer programme is compared
against life years saved by the screening programme.
The IARC working group viewpoint on breast cancer
screening concludes that there is currently limited
evidence to confirm that mammographic breast
screening can be cost effective in these middle and low
income countries. It is important to highlight that the
report does not mention if there is adequate data to
conclude that mammographic breast screening is not
cost effective for this group of countries.

India as the largest developing country in the region is
offering opportunistic breast screening for women using
both stationary and mobile breast screening facilities whilst engaging in ongoing discussions on the need and the cost effectiveness of a national screening programme [20, 21].

According to data from the national cancer registry of Sri Lanka, in 2007, breast cancer was the leading type of cancer in Sri Lanka with a life time risk of 2.056% for Sri Lankan women [22]. Cancer incidence data in 2009, states that the life time risk for women to develop breast cancer is 2.480%, indicating that 1 in every 40 Sri Lankan women has a risk of developing breast cancer [23]. The highest incidence is seen in the 55 - 59 year age group [23].

Cancer is identified as one of the four priority non-communicable diseases (NCD) to be prevented and controlled by 2020 by the World Health Organization (WHO) both globally and regionally [24]. In concurrence with the WHO directives, the Ministry of Health in Sri Lanka has proposed increasing the capacity for mammography in the national health sector in 2016 under the national multi-sectorial action plan for prevention and control of NCDs [25], but the need for a national breast cancer screening programme has not been addressed.

The need for a national breast cancer screening programme is a topic to be revisited in light of the current evidence and national requirement. Professional colleges, organized as social/academic bodies, concerned with relevant disciplines such as surgery, oncology, radiology and pathology hold a responsibility towards the community to make an initiative to discuss the need for a national breast cancer control programme with policy makers in the government.

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

References

Risk factor analysis for diabetic foot amputations

S.I. Shah, A. Hannan, S. Shah, A. Akram, E. Bashir
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Key words: Diabetic foot; foot ulcer; risk factors

Abstract

Objectives

To identify the risk factors of patients with diabetic foot ulcers who will require amputations, with special reference to Wagner's grading system.

Methodology

A total of 100 patients were included who were admitted with various grades of diabetic foot ulcers to the surgical units of Fauji Foundation Hospital. Risk factors such as Wagner's grade, family history of diabetes, compliance to treatment and HBA1c were compared with the final treatment outcome of limb salvage.

Results

Wagner's grade had a significant association with limb salvage (p=0.000). Other risk factors had no statistical significance.

Conclusions

Wagner's grading system should be more often used in the clinical assessment of patients with diabetic foot to predict limb salvage.

Introduction

Diabetes is one of the most commonly occurring chronic diseases in our country. Its' prevalence is about 10% ranging from 5.3% to 16.2% in various studies [1]. Diabetes causes complications based on its principle of micro and macro-angiopathy. It is associated with a wide array of complications but one complication which is very serious, for both the patient and physician alike, is diabetic foot.

Diabetic foot, amongst diabetics, is also very common in our setup as well as around the world. 15% to 20% of diabetic patients end up having diabetic foot ulcers at some point in their lifetime [2,3]. It is associated with increased morbidity and mortality of the patients. Patients with diabetic foot ulcers have a 2-fold death rate as compared to ones with no ulcers [4]. Patients with diabetic foot during their lifetime are subjected to depression and have very a poor quality of life. This phenomenon only gets worse with patients who end up with amputations [5,6]. Amongst all the complications of diabetes, diabetic foot should be considered a subject of importance due to the seriousness of its effects on patients' lives and more so, when its rate is increasing faster than any other diabetic complication [7].

Development of diabetic foot in a diabetic patient is dependent on many factors such as neuropathy, deformity of the foot and ultimately trauma [8]. Amongst all these problems, the start of diabetic foot disease is marked by polyneuropathy. It renders a foot with both sensory and proprioceptive deficit. This leads to inappropriate weight distribution on the foot leading to trauma [9]. Autonomic neuropathy causes increased blood pooling in limbs while motor neuropathy causes atrophic changes in musculature leading to foot deformity. A foot with sensory neuropathy lacks its protective response to injury leading to the development of ulcers. Polyneuropathy is reported to be present in 10% of cases at the time of diagnosis, but is present in 50% of diabetic patients with a longstanding history of diabetes [10].

Risk factors for development of diabetic foot ulcers, which ultimately lead to amputations in large proportions, have been discussed in detail by Edward J. et all [11]. Key factors associated with development of foot ulcers were BMI, glycaemic control (HBA1C), ESR, serum creatinine, old history of foot ulcers or amputations. Factors not associated with diabetic foot
ulcers were age, race and cigarette smoking. Overall, neuropathy and peripheral vascular disease have been identified as factors of key importance for both the development of foot ulcers and subsequent amputations [12].

Development of infection in a diabetic foot ulcer predisposes it to more serious outcome. Soft tissue infections occur more commonly as compared to osteomyelitis. Infected foot ulcers result in 55.7 times greater hospital admissions with 154.5 times greater risk of amputation [13]. Risk factors for developing an infection in ulcers are depth and duration of wound, recurrences, association with trauma and peripheral vascular disease [13]. The increased chance of infection may be explained by a decreased inflammatory response in diabetics [14] as there is a decrease in leukocyte function [15].

1% to 3% diabetic patients end up with lower limb amputations [16,17]. The patients who have to undergo major amputations have a 5 year survival rate of less than 50% [18]. The overall rate of amputations have been seen to rise to 30% in recent years [19]. This makes it a matter of great concern for the physician. Multiple factors have been reported which increase the risk of a patient to a potential amputation, but infected and non-infected foot ulcers have shown a high association with amputations. Infected and gangrenous ulcers are present in 66% to 85% of patients who are predisposed to amputations [20, 21, 22]. Other reported associations include reamputation [23], contralateral limb amputation [24], depth and stage of wound [25] and the additional presence of peripheral vascular disease and neuropathy [26].

In our study we have taken some of the factors which promise a good predictive value to detect possible future amputations and analysed their association with amputations.

Materials and methods

Our study is a uni-centric study where a total of 100 patients were enrolled. These patients were admitted with a diagnosis of diabetic foot disease to all units of the surgical department of Fauji Foundation Hospital, Rawalpindi, during the period of February 2013 to January 2014. The demographical distribution of these patients ranged from Kashmir to mid Punjab up to the Jhelum region. This covers a large area of the northern part of Pakistan.

Patients included were over the age of 18 with diagnosed diabetic foot disease. Patients who had any other cause of neuropathy or no palpable dorsalis pedis & posterior tibial pulses were excluded from the study. Although manual palpation of pulses is not a reliable indicator of blood flow in arteries, this method was not expected to bias our study results as the method was only used to exclude subjects from the study. If we had intended to include the study subjects on the basis of distal arterial blood flow, the use of more sophisticated methods would have been appropriate.

Measurement of ankle pressure was difficult to perform for us in the wards or in out-patients because of equipment constraints. Transcutaneous measurement of oxygen pressure (TcPO2) is not an accurate representation of blood supply to the foot because the pressure in the skin may be better than the deeper tissues. The university of Texas grading system was not adopted by us because it requires accurate assessment of ischaemic status of the foot in order to stage the wound but does not classify the grade of ischaemia itself. There is no provision in classification grades of what impact minor, moderate or critical ischaemia would have on different stages.

Patients were graded according to Wagner’s classification system [27] at the time of presenting with diabetic foot disease. This system of classification is based on the severity of disease, extent of tissue involvement and necrosis [28]. Details of this classification system are given in (Table 1). The decision of involvement of bone (osteomyelitis) was made on plain x-ray [29].

The final outcome of each patient was recorded alongside its Wagner’s grade. Other factors which were the subject of analysis were recorded for each of these patients. These factors were family history of diabetes, regularity of treatment, HBAIC levels and socio-economic status of the patient. Family history was defined as diabetes diagnosed in any parent or sibling of the patient. Siblings of parents or cousins of the patient were not included. Treatment was considered regular when the patient was followed up on physician-determined intervals. Treatment was considered to be irregular if the gap in follow up visits exceeded four
months.

Treatment outcome of the patients was divided into three distinct groups according to the aggressiveness of the treatment: conservative management, minor amputations and major amputations. Conservative management included non-surgical management and incision and drainage. Non-surgical management included intravenous or oral moxifloxacin if the wound was infected; saline dressings; and topical negative pressure therapy in selected cases. Minor amputations included toe amputation, mid-foot amputation, ray amputation or Syme's amputation. Major amputations included below-knee or above-knee amputations. Amputations were considered in patients with gangrene or gross osteomyelitis.

Values of HbAIC were divided to good control (< 6.5mmol/l), fair control (6.5 - 9.0mmol/l) and poor control (> 9.0mmol/l).

Patients were followed up until healing or for eight months. All of the data was recorded and analysed using SPSS version 18. All the qualitative variables were analysed using chi-square test and its p-value recorded for drawing further inference. Recorded p-value were 2-tailed and value of 0.05 or less was considered statistically significant.

Results

A total of 100 patients, who were enrolled in the study, were all type 2 diabetics with the exception of only 2 patients who were type 1. Out of all these patients, 84 were females and 16 were males with a mean age of 59.5 (±9.3) years. Complete distribution of patients into various categories of family history, treatment compliance, Wagner's grading and treatment outcome are given in (Table 2). 11 patients who were in Wagner's grade 0 and 1 had to undergo minor or major amputation as their status changed over time. All of them belonged to the group with poor glycaemic control as determined by their HbA1C levels.

<table>
<thead>
<tr>
<th>Groups</th>
<th>No. of Patients</th>
</tr>
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<tr>
<td>Male</td>
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<tr>
<td>Female</td>
<td>84</td>
</tr>
<tr>
<td>Family History of Diabetes</td>
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<td>Yes</td>
<td>55</td>
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<tr>
<td>No</td>
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<td>No</td>
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<tr>
<td>HbA1C Levels</td>
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<td>Socio-Economic Status</td>
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<td>Treatment Outcomes</td>
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<tr>
<td>Major Amputations</td>
<td>29</td>
</tr>
<tr>
<td>Wagner's Grading</td>
<td></td>
</tr>
<tr>
<td>Grade 0</td>
<td>3</td>
</tr>
<tr>
<td>Grade 1</td>
<td>34</td>
</tr>
<tr>
<td>Grade 2</td>
<td>9</td>
</tr>
<tr>
<td>Grade 3</td>
<td>16</td>
</tr>
<tr>
<td>Grade 4</td>
<td>28</td>
</tr>
<tr>
<td>Grade 5</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1: Wagner’s classification

<table>
<thead>
<tr>
<th>Grades</th>
<th>Clinical Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 0</td>
<td>No ulcer</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Superficial ulcer</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Deep ulcer, no bony involvement</td>
</tr>
<tr>
<td>Grade 3</td>
<td>bony involvement (as shown by X-ray)</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Localized gangrene</td>
</tr>
<tr>
<td>Grade 5</td>
<td>Extensive gangrene involving the whole foot</td>
</tr>
</tbody>
</table>

Note: Grade 1–3 (non-gangrenous ulcers) and Grade 4 and 5 (gangrenous ulcers)

Table 2: Patient numbers in different groups (n=100)

Most of the factors which were analysed in our study for any relation with the treatment outcome of the patient proved insignificant. Family history of diabetes (p=0.173), treatment compliance (p=0.510), long term control of blood sugar (p=0.285) and socioeconomic status of the patient (p=0.676) all proved to be statistically insignificant as related to the treatment outcome.

The only variable that shows a statistically significant association with the treatment outcome of the patient was Wagner's grade (p=0.000). Most patients with a
higher Wagner’s grade ended up with amputations whilst those with lower grades healed with conservative treatment (Table 3).

### Table 3: Wagner’s Classification vs. Treatment blocks cross-tabulation

<table>
<thead>
<tr>
<th>Wagner’s classification</th>
<th>Treatment blocks</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conservative</td>
<td>Minor amputation</td>
</tr>
<tr>
<td>Grade 0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Grade 1</td>
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<td>7</td>
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<tr>
<td>Grade 2</td>
<td>6</td>
<td>2</td>
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<td>11</td>
</tr>
<tr>
<td>Grade 4</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Grade 5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Patients (n)</td>
<td>38</td>
<td>31</td>
</tr>
</tbody>
</table>

*p-Value (0.000)

Table 3. Wagner’s Classification vs. Treatment blocks cross-tabulation

**Discussion**

Diabetic foot disease is a debilitating disease which frequently requires admission to a hospital. This leads to loss of earning capacity and significant anxiety to the patient. In addition, diabetic foot predisposes the patient to increased risk of amputation and may even be fatal. Furthermore, it is documented that a number of diabetic patients require re-amputation. Identification of the risk factors that lead to amputations is easy and can help in identifying patients at potential risk [30].

Another important aspect of this issue is cost of hospitalization and utilization of resources. Diabetic foot needs to be dealt with on a multi-disciplinary basis which involves utilization of a lot of resources. Diabetic foot has shown to increase the risk of hospitalization [31, 32]. This further consolidates the factual need for reliable predictors for potential high risk patients who are at risk of failure of conservative treatment. Therefore, it is desirable to identify factors which predispose a diabetic patient to an increased risk of a major amputation. This would allow an early amputation and hence, reduced number of admissions, reduced morbidity and a better quality of life.

In our study, the only variable that had a significant association with outcome was Wagner’s grade (p=0.000), thus making it a good predictor for clinical use. This trend is in conformity with available literature [33, 34]. There are other factors including C-reactive protein, white blood cell counts and serum creatinine levels that have been considered in clinical practice. Amongst these, serum creatinine has shown more promise of being another factor with a reliable predictive value regarding treatment outcome [35].

Our aim was to identify one factor that may assist physicians with regard to treatment of patients with diabetic foot on an in-patient or out-patient basis. Wagner’s grade is an excellent way to make such decisions in an outpatient setting as it relies on clinical assessment alone. No sophisticated gadgets or laboratory investigations are required to reach a conclusion. This is one reason why the university of Texas classification of diabetic foot was not adopted by us for the purpose of this study. Like the International Working Group grading, it requires measurement of the ischaemic status of the foot for every patient in order to determine the stage [36, 37]. This can be done either by transcutaneous measurement of oxygen pressure which may not depict the accurate status of deeper tissues [38]. Ankle-brachial index may be used for this purpose, but this classification grading does not specify the utility of various grades of ischaemia [39]. Instead we assumed that all patients with diabetic foot have some degree of ischaemia due to inherent vasculopathy, and excluded those who had critical limb ischaemia, detected clinically by absent distal pulses.

It is desirable to use a hand-held Doppler, if readily available, to measure ankle pressure or the flow in distal arteries. Those with severe or critical ischaemia should be investigated more elaborately by Doppler studies or CT angiography and managed in a vascular surgery unit. Our subjects, excluded from the study due to absent distal pulses, were nevertheless investigated more thoroughly and managed by a vascular surgeon.

The strength of this study is that it has been carried out in Pakistani patients with their particular circumstances. Another advantage is that this study has come up with a predictive tool that relies exclusively on clinical examination. This makes it an important contribution for healthcare systems with resource constraints that are
catering to large populations of diabetic patients [40]. The weakness of the study is that it included patients from a particular region in Pakistan and may not be representative of the whole country.

**Conclusion**

Wagner’s grading system is an effective tool in assessing patients’ severity of disease and the possible future outcome patient will have. This tool should be used more often while assessing patients with diabetic foot disease. This will help a clinician to distribute the hospital resources more efficiently and to the most deserving of the patients. Better prediction of a patient at potential risk of amputation can be managed aggressively and with a better devised multi-disciplinary approach. This ultimately saves the health care system a lot of time and resources, and delivers better treatment to the patients.

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

**References**

26. Lavery LA, van Houtum WH, Armstrong DG:


Microvascular reconstruction of oro-facial defects; a review of one surgeon's experience

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2 Teaching Hospital Peradeniya, Sri Lanka

Key words: Microvascular surgery; tracheostomy, reconstruction; free flaps; venous thrombosis

Abstract

Introduction

The practice of microvascular surgery is currently limited to a few centres in Sri Lanka. This type of surgery requires specialist training and a dedicated team. A retrospective review of the microvascular reconstructions carried out by one surgeon at the Dental Hospital, Peradeniya, Sri Lanka, was performed and the outcome has been analysed. The resection, neck dissections, the harvest of the flap and the reconstructions were performed single-handedly.

Methods

This is a retrospective study. Details were obtained from the theatre register, clinical notes and from the surgeon's personal data base. Patient identity, age, sex, diagnosis, type of surgery, reconstruction type, vein grafts, complications, anticoagulants used, type of anastomosis, tracheostomy, intubation period, flap salvage and final outcome were recorded.

Results

During the period from 2007 to 2010, 33 microvascular reconstructions were performed by the first author. Twenty two patients had resections for oral malignancies. The commonest flap was the fibula flap (16 cases), followed by the radial forearm flap (13 cases). There were four anterior lateral thigh flaps as well. The success rate was 82% with six failures. There were 21 males and 12 females. The average age was 44.7, ranging from 14 years to 64 years. The male to female ratio was 2.7:1. Seven patients (21%) were taken back to the theatre for exploration. Six patients developed thrombosis of the vessels. Only one flap thrombosis was identified in time and this was salvaged by re-anastomosis. No tracheostomies were performed electively. Patients were managed in the dedicated intensive care unit by keeping the endotracheal tube longer to secure the airway. Seventy five percent (75%) of patients were extubated within 48 hours.

Conclusions

Microvascular surgery is technically highly demanding. The success rate (82%) here is lower compared to more well-established units around the world. Three types of flaps have been used in this series. The commonest cause of flap loss was venous thrombosis. Proper training of nurses and junior doctors in recognising early signs of flap failure, close monitoring, prompt exploration when indicated and meticulous post-operative management during the first 72 hours would have given better flap survival. Tracheostomies can be avoided despite major head and neck resections. Ideally, two teams should work together to save time and minimise surgeon fatigue.

Introduction

Defects of the oro-facial region arise congenitally, from tumour resections or due to trauma. Reconstruction of these defects can be challenging due to the fact that the form and functions of the face and oral cavity have to be restored.

Tissue reconstruction can be performed with local flaps, pedicled flaps or with free flaps. Free flaps will require microvascular anastomosis. As such, it requires special training and a dedicated team.

In head and neck reconstruction, the commonly used free flap is the radial forearm free flap for soft tissue defects. However, anterior lateral thigh flap, rectus
abdominus flap and latissimus dorsi flap are other alternatives. For hard tissue reconstructions, a fibula free flap has become the most popular flap. Composite radial forearm flap or deep circumflex iliac artery flap can also be used according to the size of the bony defect.

This review paper is a result of an audit conducted by the authors to identify the issues affecting microvascular surgery at the Dental Hospital, Peradeniya. All the resections and reconstructions were performed by the first author. The cases were performed between 2007 and 2010 during his tenure at this institution.

The author feels that it is important to review and publish this data as microvascular surgery is currently being performed only in a few centres in Sri Lanka. Microvascular free tissue transfer is highly demanding in terms of skill required of the surgeons as well as the supporting teams such as anaesthetists and nursing staff. In view of the complexity of the reconstructions undertaken and the stress of the length of surgery, surgeons need to regularly practise their surgical skills as the learning curve is quite steep.

**Rectus Abdominus flap (RA)**

This flap is based on the deep inferior epigastric artery from the external iliac system. As this flap incorporates the rectus muscle, a post-operative troublesome abdominal wall hernia is a possibility.

**Latissimus Dorsi flap (LD)**

A flap based on the thoracodorsal artery via the subscapular artery. This flap gives the best coverage for significant tissue losses. However, harvesting the flap requires positioning of the patient in a lateral decubitus position. As such, it is not possible to have two teams working simultaneously, adding to the surgical time.

**Fibula Free Flap (FFF)**

This is the most popular flap for the reconstruction of mandibular defects. This flap is based on the peroneal artery and venae commitantes accompanying it. The pedicle length can be extended according to the need. A skin paddle based on the lateral crural septum can be used to reconstruct the oral or extra oral defects. Donor site morbidity is very low, resulting in full function of the lower limb in most cases. This flap gives a significant length of bone for even full reconstruction of the mandible [1].

**Deep Circumflex Iliac Artery Flap (DCIA)**

Based on the deep circumflex iliac artery, this is an alternative to the fibula flap. The pedicle length can be short. The length will depend on the size and position of the bone flap and skin paddle. This flap gives plenty of bone bulk.

**Materials and methods**

A retrospective study was carried out on the patients treated by the first author. All patients were treated at the Dental Hospital, Peradeniya. The theatre register was used to identify the patients and the surgeon himself also maintained a database of all his cancer surgeries. Hospital clinical records were used to gather any further required information.

The following information was gathered:

Patient identity, age, sex, diagnosis, type of surgery, reconstruction type, vein grafts, complications, anticoagulants used, type of anastomosis, tracheostomy, intubation period, flap salvage and final outcome.
Neck dissection was performed first, followed by resection of the lesion and the free flap was then harvested. The artery was irrigated immediately with heparinised saline. The anastomosis and reconstruction were performed last. Flaps were anastomosed within 4 hours of harvest using 9/0 ethilon or silk for the anastomosis. The magnification varied from 2.5 to 5. End to end artery anastomosis and end to side anastomosis of the vein to the internal jugular vein was carried out as standard practice. The anastomosis site was irrigated with plain lignocaine and warm saline to prevent vasospasm. In every case the artery was anastomosed first. Every patient received a subcutaneous dose of Enoxaparin or Deltaparin just before the anastomosis and this was continued postoperatively for five days.

All patients were nursed in a dedicated intensive care unit. None of the patients had tracheostomies, but the airway was maintained post operatively by prolonged nasal intubation. The endotracheal tube remained in place until it was safe to extubate. Visual assessment was used daily as a guide to assess the patency of the airway. This was performed by inspecting the oropharynx. A joint decision was made by the surgeon and the anaesthetic team before extubating the patient.

Perfusion of the flaps was assessed by inspection of the colour and the consistency of the flap. Flaps were gently probed with an orange needle (25 gauge) and watched for bleeding. This was performed three times a day during the first 72 hours post operatively. Bright red blood appearing slowly was considered as an indication of good perfusion. Dark congested blood appearing rapidly is an early indication of venous congestion. Flap colour was not a good parameter to monitor as the majority of our patients had dark skin. However, flap congestion will lead to darkening of the skin paddle. This also causes a change in flap consistency to an oedematous look. Arterial problems will cause the flap to shrink and appear pale.

Capillary refill was only used to assess the flap in fair skinned patients. Although this is a great way to assess the perfusion, this cannot be used reliably in darker skinned patients. The temperature of the flap has no value in monitoring intra oral flaps as they are always bathed in saliva at body temperature.

The flaps were monitored three times a day by the same surgeon and needle probing was used as the gold standard. The ICU staff also assessed the flaps on an hourly basis. This was performed by inspection and with the use of a doppler. However, the doppler may give a false sense of security. An artery may be working well up to the anastomotic site and will give a strong positive sound, but there may be a clot at the site of anastomosis. Therefore, it is paramount that the doppler is used at a site distal to the anastomosis.

If there was any concern about the flap perfusion, nursing staff and the junior doctors were instructed to call the surgeon immediately. After further assessment, if indicated, the patient would be taken to the theatre for flap salvage by the author.

Intra- and post-operatively patients were given either Enoxaparin 40 mg S.C or Deltaparin 5000 units S/C once daily. Adequate hydration was given and a good urine output was maintained. Unfortunately, we were not able to maintain a warm room temperature due to a faulty air conditioner. Haemoglobin (Hb) was maintained around 10g/dl and transfusions were carried out only if Hb fell below 7-8g/dl.

Use of catecholamines was generally avoided. Hypotension was usually secondary to the blood/loss or vasodilation and was treated with IV fluids.

Results

A total of 33 microvascular procedures were performed during a 7 year period, from 2003 to 2010.

Twenty-two patients had excision of oral malignancies, neck dissections and reconstruction. Five patients had bilateral neck dissections. The majority of malignancies were squamous cell carcinomas with only one chondrosarcoma. There were also six ameloblastomas and one case of a recurrent keratocystic odontogenic tumour. Two patients had defects of the mandible due to trauma.

There were two children in this series. One was diagnosed with an aneurysmal bone cyst of the mandible and the other had an ossifying fibroma involving the mandible.

Sixteen flaps were fibula flaps, followed by thirteen radial forearm flaps and four anterior lateral thigh flaps
as well.

There were 21 males and 12 females. The average age was 44.7, ranging from 14 years to 64 years. The male to female ratio was 2.7:1. Seven patients (21%) were taken to the theatre for re-exploration.

Post-operatively, ten patients were extubated within 24 hours. Fourteen patients were intubated for 48 hours. Four patients had the endotracheal tube in for 72 hours. Only three patients were intubated for more than three days. The longest intubation was for seven days in a patient who developed pneumonia. There were six failures resulting in a success rate of 82%.

Results are summarised in Table 1.

Discussion

There were 33 microvascular free flaps performed by the first author from 2007 to 2010. Out of that 13 were radial forearm free flaps (RFFF). This flap was used mainly for the reconstruction of the tongue, floor of the mouth and the buccal regions. The radial artery was anastomosed to either the superior thyroid, lingual or to the facial artery. In all cases, the venous anastomosis was to one of the venae comitantes. The cephalic vein was not harvested routinely in order to cut down the time of harvest.

Sixteen flaps were fibula free flaps (FFF). The fibula flap with skin paddle was used for the reconstruction of the mandible.

The skin paddle based on the lateral crural septum was used to reconstruct the soft tissue defect resulting from the resection. In most cases this involved the floor of mouth. In one case the skin paddle was used to

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Diagnosis</th>
<th>Site</th>
<th>Neck Dissection</th>
<th>Post-op intubation</th>
<th>Reconstruction</th>
<th>Arterial Anastomosis</th>
<th>Flap Salvage?</th>
<th>Vein graft?</th>
<th>Complications</th>
<th>Outcome</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>F</td>
<td>SCC</td>
<td>Buccal</td>
<td>yes</td>
<td>24</td>
<td>RFFF</td>
<td>Lingual</td>
<td>No</td>
<td>No</td>
<td>Haematoma</td>
<td>Good</td>
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<tr>
<td>2</td>
<td>62</td>
<td>M</td>
<td>SCC</td>
<td>Tonsill</td>
<td>yes</td>
<td>48</td>
<td>RFFF</td>
<td>Lingual</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
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<td>3</td>
<td>55</td>
<td>F</td>
<td>SCC</td>
<td>Tongue</td>
<td>Bilateral</td>
<td>72</td>
<td>RFFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>Haematoma</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>M</td>
<td>SCC</td>
<td>Tongue</td>
<td>Bilateral</td>
<td>120</td>
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<td>ST</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
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<td>M</td>
<td>SCC</td>
<td>Tongue</td>
<td>yes</td>
<td>48</td>
<td>RFFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>Haematoma</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td>M</td>
<td>SCC</td>
<td>FOM</td>
<td>Bilateral</td>
<td>72</td>
<td>RFFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>Wound infection</td>
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<td>58</td>
<td>M</td>
<td>SCC</td>
<td>Tonsill</td>
<td>yes</td>
<td>48</td>
<td>RFFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>Haematoma</td>
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<tr>
<td>8*</td>
<td>60</td>
<td>M</td>
<td>Ambl</td>
<td>Mand</td>
<td>No</td>
<td>24</td>
<td>FFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
<tr>
<td>9</td>
<td>31</td>
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<td>Ambl</td>
<td>Mand</td>
<td>No</td>
<td>31</td>
<td>FFF</td>
<td>ST</td>
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<td>Good</td>
</tr>
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<td>10</td>
<td>62</td>
<td>M</td>
<td>SCC</td>
<td>Tongue</td>
<td>Bilateral</td>
<td>72</td>
<td>RFFF</td>
<td>Facial</td>
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<td>No</td>
<td>Arterial clot</td>
<td>Failed</td>
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<td>ST</td>
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<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
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<td>12</td>
<td>15</td>
<td>F</td>
<td>ABC</td>
<td>Mand</td>
<td>No</td>
<td>48</td>
<td>FFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
<tr>
<td>13</td>
<td>49</td>
<td>M</td>
<td>SCC</td>
<td>Mand</td>
<td>Yes</td>
<td>48</td>
<td>FFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
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<td>14</td>
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<td>Mand</td>
<td>Yes</td>
<td>48</td>
<td>FFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
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<td>15</td>
<td>24</td>
<td>M</td>
<td>RTA</td>
<td>Mand</td>
<td>No</td>
<td>48</td>
<td>FFF</td>
<td>ST</td>
<td>Yes</td>
<td>No</td>
<td>Venous clot</td>
<td>Failed</td>
</tr>
<tr>
<td>16</td>
<td>59</td>
<td>M</td>
<td>SCC</td>
<td>Tongue</td>
<td>Yes</td>
<td>72</td>
<td>RFFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>Prolonged bleeding</td>
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<td>Ambl</td>
<td>Mand</td>
<td>No</td>
<td>48</td>
<td>FFF</td>
<td>ST</td>
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<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
<tr>
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<td>F</td>
<td>SCC</td>
<td>Max</td>
<td>No</td>
<td>24</td>
<td>ALT</td>
<td>ST</td>
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<td>No</td>
<td>Venous clot</td>
<td>Failed</td>
</tr>
<tr>
<td>19</td>
<td>39</td>
<td>F</td>
<td>SCC</td>
<td>Max</td>
<td>No</td>
<td>24</td>
<td>RFFF</td>
<td>ST</td>
<td>Yes</td>
<td>No</td>
<td>Artery clot, Deep Vein Thrombosis</td>
<td>Failed</td>
</tr>
<tr>
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<td>58</td>
<td>M</td>
<td>SCC</td>
<td>Tongue</td>
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<td>7 days</td>
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<td>Facial</td>
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<td>Mand</td>
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<td>24</td>
<td>FFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
<tr>
<td>22</td>
<td>46</td>
<td>M</td>
<td>Ambl</td>
<td>Mand</td>
<td>No</td>
<td>48</td>
<td>FFF</td>
<td>ST</td>
<td>Yes</td>
<td>No</td>
<td>Venous clot</td>
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</tr>
<tr>
<td>23</td>
<td>60</td>
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<td>SCC</td>
<td>Mand</td>
<td>No</td>
<td>5 days</td>
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<td>Ch SC</td>
<td>Mand</td>
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<td>5 days</td>
<td>FFF</td>
<td>ST</td>
<td>Yes</td>
<td>No</td>
<td>Maggots</td>
<td>Failed</td>
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<td>SCC</td>
<td>Tongue</td>
<td>Bilateral</td>
<td>48</td>
<td>RFFF</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Good</td>
</tr>
<tr>
<td>26</td>
<td>64</td>
<td>F</td>
<td>SCC</td>
<td>Buccal</td>
<td>yes</td>
<td>24</td>
<td>ALT</td>
<td>ST</td>
<td>No</td>
<td>No</td>
<td>Venous clot 5/7</td>
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<td>27</td>
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<td>M</td>
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<td>Tongue</td>
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<td>25/7</td>
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<td>Mand</td>
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<td>48</td>
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<tr>
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<td>51</td>
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<td>48</td>
<td>ALT</td>
<td>ST</td>
<td>No</td>
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<tr>
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<td>51</td>
<td>M</td>
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<td>Mand</td>
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<td>48</td>
<td>FFF</td>
<td>ST</td>
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<td>Mand</td>
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Table 1. Summary of results.

reconstruct the buccal cheek excision. In a bilateral reconstruction of the mandible due to a war injury, the skin paddle was used temporarily to monitor the flap. After three months the excess skin in the submental region was excised [1]. Every fibula was harvested with an attached skin paddle to enable monitoring of perfusion.

There were four anterior lateral thigh (ALT) flaps. In three cases they were used to reconstruct the tongue and in one instance, it was used to reconstruct a maxillary/cheek defect.

A vein graft had been used in only one instance for a fibula flap with a short pedicle.

The overall success rate was 82% with six failures. This is less than the standard success rate in major head and neck reconstructive units across the world. They have reported success rates of above 90%. However, in a study conducted in Uganda (their first ever 19 consecutive cases) the success rate was 79% [2]. This compares well with this study as the developing countries face similar constraints. It is clear that the success rate depends on the meticulous technique and the post-operative monitoring. One has to rely on the junior staff for early detection of the thrombosis and hence, staff training is vital. In most cases the culprit is a venous thrombus which occurs within the first 24 hours in most cases. There is little benefit in taking the patient back to the theatre when the clot is well established as the ischaemic damage has already taken place and the tissues will not survive. Re-establishment of the perfusion must take place within five hours to avoid the no-reflow phenomenon [3].

Studies state that the rate to return to theatre for flap salvage is 15% [4]. In this series, seven out of thirty three patients were taken back to theatre. This amounts to 21%. Six patients developed thrombosis of the anastomotic vessels and the other was infested with maggots. Out of that only one flap was successfully salvaged. This flap regained perfusion after the vein was re-anastomosed. In the other five, there was a significant delay in recognising the complication which led to unsuccessful salvage. Had the thrombotic events been recognised in time it would have given a better outcome. This emphasises the need for close post-operative monitoring of free flaps. Monitoring should
be done at hourly intervals during the first 72 hours by an experienced nurse. If there are any concerns, the consultant must be informed immediately. In our unit there was a learning curve and the flaps were monitored by inexperienced staff at the beginning. The author personally checked the flaps three times a day during the first 72 hours. In this series the majority of failures were due to venous clots. One flap failed on the 5th post-operative day. This is most unusual and the authors feel that dehydration was the cause as the patient was out of the ICU as the staff mistakenly felt that she was doing well. Therefore, proper hydration and careful fluid balance charting are vital, even after the first 72 hours.

All procedures, including resections, neck dissections, the harvest of the flap and the reconstruction, including anastomosis were performed by the first author. No trainee surgeons (registrars) were available to help. Therefore, it was lengthy surgery and surgeon fatigue was high.

It was not possible to regulate the temperature in the intensive care unit due to the faulty air conditioner and this was not favourable for flap survival as it was difficult to maintain a cold room temperature. This is not the optimal management of a post-operative patient with a free flap. The author recommends a warmer temperature during intra and post-operative periods.

One ALT flap failed (out of four) and the same patient suffered a failure of a radial forearm flap as well a week later. She later developed deep venous thrombosis of both lower limbs. It was believed that she was a thrombogenic individual and no further free flaps were considered for her. The defect was later closed with a cervico-facial flap.

Two fibula flaps failed out of 16. One was following an attempt to reconstruct the whole mandible for a chondrosarcoma in an 18 year old man. The vessels were eaten away by maggots during the first 24 hours post operatively. The patient had received chemotherapy and radiotherapy prior to surgery and the fungating wound was infested by maggots at the time of surgery. Despite thorough excision and debridement a few maggots managed to hide under the flesh and appeared later to damage the flap.

Two radial forearm flaps failed out of 13 flaps.

Tracheostomies were not performed in any of these cases. There was a dedicated intensive care unit and it was possible to keep the endotracheal tube for an extended period of time. Twenty five (75%) patients had the endotracheal tube extubated in 48 hours. One patient who developed respiratory difficulties had the tube in for seven days. However, if an ICU facility is an issue due to high patient demand, an elective tracheostomy should be performed [5].

The ideal criteria for post-operative management is:

- Haematocrit 30-35%
- Normothermia
- High cardiac output
- Systolic blood pressure (> 100 mm Hg).
- Good urine output >1ml.kg^{-1}.h^{-1}
- SpO2 > 94% (O2 in the first 24 hours)
- Hourly flap monitoring
- Adequate analgesia

**Conclusions**

This paper studied the outcome of microvascular reconstructions by a single surgeon in a Sri Lankan unit. This is the first published outcome of a series of microvascular reconstruction of head and neck defects in Sri Lanka.

The ability to reconstruct head and neck defects with free flaps is considered to be a necessary skill of all surgeons involved in head and neck resections. These surgeries are highly technique-sensitive procedures. Free flaps have many advantages, including the ability to get a wider clearance of the tumour without worrying about the extent of the resection. Ideally, two teams should work together to save time and minimise surgeon fatigue.

It appears that most oro-facial defects can be reconstructed with the help of three microvascular flaps, namely the radial forearm flap, the fibula flap and the anterior lateral thigh flap. Every fibula was harvested with an attached skin paddle to enable monitoring of flap perfusion.

There was no need for elective tracheostomy. If the facility is available however, prolonged post-operative intubation will help to avoid the complications of tracheostomies.
Meticulous technique, proper instruments, close supervision of the flaps and optimal post-operative management of the patient will help in achieving a better success rate.

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.

No specific tests or personal information was included in the study. The information was analyzed from the surgeon’s database.

References

Motor bicycle and three wheeler related road traffic accidents – burden to accident and emergency service of a tertiary care hospital: a clinical audit

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Orthopaedic Unit, Colombo South Teaching Hospital, Kalubowila, Sri Lanka

Key Words: Road traffic accidents; motor cycle; three-wheelers

Abstract

In the past few decades statistical data shows an increase in the total number of accidents in Sri Lanka. A retrospective analysis of admission records in the Accident and Emergency (A&E) service and the hospital police records related to road traffic accidents was done for a period of 3 months. In a total of 1210 RTA, 426 were due to motorcycle accidents (MC) and 201 due to three-wheeler (TW) accidents. In MC accidents, there were 55.6% bicycle riders, 20.4% pillion riders and 23.9% third party individuals. Among them 10.6% had open fractures, 15.5% closed fractures and 73.9% other injuries. Thirty five percent of bicycle riders were under the influence of alcohol at the time of the accident. Among the victims of TW accidents there were 26.8% TW drivers, 50.7% passengers and 22.4% third party individuals. Fifty seven patients had fractures in which 11.9% of them were open. Thirty three percent of TW drivers were under the influence of alcohol at the time of the accident. Nearly half of RTA related admissions are due to MC and TW accidents. In almost one third of the accidents, drivers were under the influence of alcohol during the incident.

Introduction

Motorcycles (MC) and three-wheelers (TW) are a popular mode of transport in third-world countries. MC is popular as a mode of personal transport and TW is popular as a mode of commercial public transport. The reason for the popularity of these vehicle types are most probably due to the low market price, low maintenance cost and easy handling in traffic congested roads. The numbers of MC and TW on the road has significantly increased in the recent past.

In the past few decades statistical data shows an increase in the total number of accidents in Sri Lanka. The traffic police continue to control this alarming rate of accidents. The main reason for the rapid increase is due to an increase in vehicle ownership together with inadequate road network development, which cannot support the demand [1].

The intention of this audit is to determine the burden of MC and TW accidents in an Accident and Emergency unit of a tertiary care hospital in Sri Lanka.

Materials and methods

A retrospective analysis of admission records in the A&E service and the hospital police records related to RTA were collected over a period of 3 months from 01-05-2015 to 31-07-2015.

Results

The total admissions to the A&E during the period of analysis was 3542 out of which 1210 (34%) admissions were due to road traffic accidents. Among the RTA, 426 (35.2%) admissions were due to MC accidents and 201 (16.6%) were due to TW accidents. The rest of the admissions were due to injuries not related to RTA e.g. fall from a height, assault, electrocution injuries etc [Figure 1].

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E-mail: yohan.abeysekera@yahoo.com
In analysis of victims of MC accidents, there were 237 (55.6%) bicycle riders, 87 (20.4%) pillion riders and 102 (23.9%) third party individuals. Among victims of MC accidents, 45 (10.6%) had open fractures, 66 (15.5%) sustained closed fractures and 315 (73.9%) individuals had other injuries. 35% of bicycle riders were under the influence of alcohol at the time of accident. Among admissions for TW accidents there were 54 (26.8%) TW drivers, 102 (50.7%) passengers and 45 (22.4%) third party individuals. Fifty seven patients had fractures in which 24 (11.9%) of them were open. 33% of TW drivers were under the influence of alcohol at the time of the accident. There were 18 (1.5%) on admission deaths reported due to RTA during the above period out of which 5 were due to TW accidents and 3 were due to MC accidents.

Discussion

Motorcycles and three-wheelers have significantly increased in numbers and this is evident according to the latest statistics published by the Ministry of Internal transport of Sri Lanka. Even though the percentage of MC and TW within the total vehicle population has not increased significantly over the years, the total vehicle population together with the MC and TW populations have increased significantly. When considering new registrations, the highest number of MC new registrations were recorded for the year 2014 since 2007 [2] [Figure 2 & 3].

As indicated in another local study conducted in the North Central Province of Sri Lanka, 65% of RTAs were due to MC and 11% were due to TW [3].

![Figure 2. Total vehicle, MC and TW population changes from 2007 up to 2014](image)

![Figure 3. MC and TW new registrations from 2007 up to 2014](image)
Alcohol seems to be a significant cause for accidents due to both MC and TW, as in one third of the accidents in both categories the drivers were under the influence of alcohol. In most cases, the type of alcohol consumed was stated to be “Strong Beer”.

Management of RTA patients will add a significant cost to the health care system whilst also leading to a significant proportion of the workforce in the country being disabled. It seems that the authorities have not realised the gravity of the situation as no restrictions are yet imposed to control the rising MC and TW population in the country. In contrast, unwise decisions such as tax deductions on these vehicles, have been entertained.

In order to control the accidents related to MC and TW it is important to take immediate steps to control the new registration of MC and TW by increasing the importation taxes on these vehicles. Strict road traffic laws should also be implemented for both TW drivers and MC riders, with an increase in the value of fines for any road related offences.

**Conclusion**

Nearly half of RTA related admissions are due to MC and TW accidents causing a significant burden to the A&E unit. In both categories, almost one third of the accidents drivers were under the influence of alcohol during the incident.

**Acknowledgement**

The authors would like to thank Mr. GGD Kumara, Police constable from the Hospital police unit of Colombo South Teaching Hospital, the MOIC, the Sister-in-charge, and the staff of the A&E Unit of Colombo South Teaching Hospital.

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

**References**

3. Weerawardena WAK, Illanagasingha TDB, Piyadasa IJ, Rathnayaka SM, Subaweera WDUPL, Niroshana GAL. Analysis of patients admitted with history of road traffic accidents to surgical unit B Teaching Hospital Anuradhapura, Sri Lanka; Anuradhapura Medical Journal 2013; 07: 02-05.
Keywords: Endoscopy; dyspepsia; gastrointestinal malignancy

Abstract

Introduction

Dyspepsia is a major cause of gastrointestinal (GI) system related morbidity in Sri Lanka. The aim of this study is to describe upper GI endoscopic findings and to explore the association between alarm features (AF) and upper GI malignancy in dyspeptic patients.

Methods

This is a cross-sectional study conducted on newly diagnosed dyspeptic patients in a general surgical unit of a tertiary care hospital from April 2014 to March 2015. Following the administration of a pre-tested interviewer-administered questionnaire, endoscopies were performed.

Results

A total of 111 endoscopies were performed. The male to female ratio was 1:1.05 and the mean age of the population was 50.7 years. Endoscopic findings consisted of normal gastric and duodenal mucosa (n=20, 18.0%), gastro-duodenal ulcers (n=04, 3.6%), erosive gastro-duodenitis (n=18, 16.2%), erythematous gastro-duodenitis (n=45, 40.5%), oesophagitis (n=06, 5.4%), hiatal hernia (n=09, 8.1%) and upper GI malignancy (n=09, 8.1%). The relationship between AF and malignancy was statistically significant (p<0.001). Sensitivity of AF was 89% and specificity was 88% in detecting malignancies.

Conclusion

Benign conditions of the upper GI tract accounts for dyspepsia in >90% of patients. AF seems to hold satisfactory validity as a screening tool for malignancies. Dyspeptic patients with AF should undergo early endoscopic study to exclude malignancy.

Introduction

Dyspepsia refers to a group of upper gastrointestinal symptoms which is a common clinical presentation for seeking health care worldwide, and Sri Lanka is no exception [1]. Prevalence of dyspepsia is estimated to be between 12 - 41% of the general population [2]. According to the Ministry of Health - Indoor Morbidity Mortality data of Sri Lanka, peptic ulcer disease (PUD) and gastro-oesophageal reflux disease (GORD) are the second commonest causes of gastrointestinal (GI) related diseases after infectious diseases [3]. Out of these patients approximately 60% are among the 17 - 49 year age group. Time loss from work and interference with quality of life are also considerable problems even though difficult to assess.

The Rome III criteria defines dyspepsia as the presence of one or more of the following symptoms; bothersome post-prandial fullness, early satiation, epigastric pain or burning [1]. These symptoms are associated with a wide range of disease entities including peptic ulcer disease, gastro-oesophageal reflux disease, non-ulcer dyspepsia, oesophageal and gastric carcinoma [4].

Upper gastrointestinal endoscopy (UGIE) is the gold standard investigation for the diagnosis of underlying disease amongst dyspeptic patients. However, performing UGIE in all dyspeptic patients is neither safe nor cost effective. Therefore a number of criteria and guidelines have been made to decide which patient should undergo UGIE. Alarm features, also called alert features, red flags, or warning signs, are specific features thought to be associated with upper GI malignancy, warranting an UGIE. Alarm features include progressive dysphagia, anorexia, odynophagia, persistent vomiting, family history of upper GI malignancy, unintended weight loss, GI bleeding or iron deficiency anaemia, palpable mass or lymphadenopathy.
and jaundice [4 - 6].

Current guidelines in the United Kingdom and USA recommend that in the initial evaluation of patients with dyspepsia, the decision to perform an endoscopy should be based on older ages and alarm features as it is generally believed that these factors indicate a higher probability of malignancy being present. In young patients without alarm features, the recommendation is initial treatment and endoscopy at later stage (treat and test method) [4, 7].

On the other hand in east-asian countries, where a high incidence of gastric carcinomas are recorded, the predictive value of alarm symptoms have been questioned as patients with carcinoma present without alarm symptoms [8 - 10]. In those countries, population based endoscopic screening is performed to detect early malignancies, but this would not be cost effective in Sri Lanka due to the low prevalence of upper GI malignancy [11].

Due to a lack of local guidelines with regard to the management of dyspepsia, clinicians were in doubt as to whether to 'Treat and Test' or vice versa. This lead to either unnecessary UGIE or missing an early stage of malignancy. Hence, a filtering mechanism would be beneficial in selecting high risk patients for UGIE. This study explores the potential role of the alarm features as a filtering mechanism, enabling cost-effective management of patients whilst also ensuring optimal management.

Objectives of the study were to describe the upper gastrointestinal endoscopic findings in dyspeptic patients who presented to a surgical unit at the Colombo North Teaching Hospital (CNTH), and to describe the association between alarm features and the presence of upper GI malignancies among dyspeptic patients.

Methods

A descriptive cross-sectional study was conducted at the general surgical unit of CNTH from April 2014 to March 2015.

Inclusion criteria:
- Newly diagnosed patients with dyspeptic symptoms who underwent UGIE as a management step
- Decision of UGIE was based on ASGE and NICE guidelines [8, 9]
- Patients above 18 years of age
- Proton pump inhibitors were withheld for 2 weeks prior to UGIE

Exclusion criteria:
- Patients who underwent an endoscopy with known ulcer disease
- Patients who undergo a second-look endoscopy for suspected malignancy
- Post-gastric surgery patients on follow up
- Patients who underwent endoscopy for other causes such as bleeding oesophageal varices

Patient recruitment was done by simple randomization. Minimal sample size for the analysis stage was calculated as per the formula of Lwanga and Lemeshow, and expected prevalence of upper GI malignancy in patients with dyspepsia was taken as 5.6% (a documented figure) [12].

Pre-tested interviewer administered questionnaires and a data extraction sheet was used for data collection. The questionnaire gathered data on socio-demographic variables, risk factors (smoking, alcohol consumption, betel chewing and the use of non-steroidal anti-inflammatory drugs - NSAID) and selected clinical details.

UGIE was performed by the principal investigator and the supervisor with the same set of instruments. Both investigators were present during the endoscopies to eliminate inter-observer variations. Endoscopic atlases were referred to whenever necessary [13, 14]. Biopsies of suspicious lesions were analysed and reported by the consultant histopathologist of the hospital. Histology reports were traced using patient identification number. These details were extracted by a data extraction sheet. Data was analysed using SPSS version 17 (SPSS Statistics for Windows 2008. Chicago: SPSS Inc). Socio-demographical and disease-related categorical variables were given in frequencies with their percentages. The associations between the upper GI malignancy and selected factors (alarm features and age) were analysed by Pearson chi-square test. A p-value of 0.05 was taken as the significance level. The sensitivity, specificity, positive predictive value and negative predictive values were calculated for the alarm features as the “screening method” and also for the endoscopy findings that confirmed presence of upper GI malignancy as the “diagnostic test result”.

Written informed consent was taken from all the participants and data collection was done without hindrance of the clinical management of the patient.

**Definitions of variables:**

Alarm features included: progressive dysphagia, anorexia, odynophagia, persistent vomiting, family history of upper GI malignancy, unintended weight loss (>10% of body weight), GI bleeding or iron deficiency anaemia, palpable mass or lymphadenopathy and jaundice [4, 6, 15].

Oesophagitis was defined by the modified Savary-Miller classification [4, 16]. Biopsies were performed in the presence of irregular or deep ulceration, proximal distribution of oesophagitis and in irregular/malignant-appearing strictures to identify malignant lesions.

A hiatus hernia was diagnosed if the Z-line remains more than 2 cm above the hiatus of the diaphragm [17]. Lesions <5mm, shallow and with no scarring were considered to be erosive gastro-duodenitis [13, 14, 17].

Significant endoscopic findings in the upper GI tract were defined as presence of endoscopically visible tissue destruction or gross mucosal alterations. The presence of any of the following lesions was considered as significant endoscopic findings: gastric and duodenal ulcers, oesophagitis, hiatus hernia, erosive gastritis or duodenitis, neoplasm, masses and polyps. The presence of any of the following was considered as insignificant structural lesions: erythematous gastritis and duodenitis, atrophic gastritis, incidental miscellaneous abnormalities and absence of any mucosal changes [15, 18].

**Results**

A total of 111 patients with dyspeptic symptoms were studied during a period of 12 months. 54 (49%) were male and 57 (51%) were female with 1:1.05 male to female ratio. Mean age of the sample was 50.7±16 years. Fifty eight (52%) patients had one or more of the following risk factors; cigarette smoking, betel chewing, alcohol consumption and NSAID use.

As shown in Table 1, the significant endoscopic findings were gastro duodenal ulcers (n=04, 3.6%), erosive gastro-duodenitis (n=18, 16.2%), oesophagitis (n=06, 5.4%), hiatal hernia (n=09, 8.1%) and upper GI malignancy (n=09, 8.1%). Out of those malignancies, 4 patients had gastro-oesophageal junctional, 3 patients had gastric and 2 patients had lower oesophageal malignancies. Normal gastric and duodenal mucosa without structural lesions was observed in 20 (18.0%) patients, and erythematous gastro-duodenitis was seen in 45 (40.5%) patients [Table 1].

<table>
<thead>
<tr>
<th>Finding</th>
<th>No of patients</th>
<th>Percentage</th>
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<tr>
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<td>04</td>
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</tr>
<tr>
<td>Erosive gastritis &amp; duodenitis</td>
<td>18</td>
<td>16.2%</td>
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<tr>
<td>Oesophagitis</td>
<td>06</td>
<td>5.4%</td>
</tr>
<tr>
<td>Hiatal hernia</td>
<td>09</td>
<td>8.1%</td>
</tr>
<tr>
<td>Upper GI malignancy</td>
<td>09</td>
<td>8.1%</td>
</tr>
<tr>
<td>Erythematous gastritis &amp; duodenitis</td>
<td>45</td>
<td>40.5%</td>
</tr>
<tr>
<td>No mucosal abnormality</td>
<td>20</td>
<td>18.0%</td>
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Table 1. Upper GI endoscopy findings

The relationship between alarm features and upper GI malignancy was statistically significant (p<0.001) [Table 2].

<table>
<thead>
<tr>
<th>Groups</th>
<th>Endoscopic Outcome</th>
<th>Total</th>
<th>χ² test</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Dyspepsia with alarm features (%)</td>
<td>Malignant (%)</td>
<td>Benign(%)</td>
<td>20</td>
<td>33.302</td>
</tr>
<tr>
<td>Dyspepsia without alarm features(%)</td>
<td>1(0.9)</td>
<td>90(81.1)</td>
<td>91</td>
<td></td>
</tr>
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</table>

Table 2. Relationship between alarm features and upper GI malignancy

* Exact significance considered

Age of the patient and the presence of malignancy also had a statistically significant relationship (p<0.05) when 50 years of age was taken as the cut-off age [Table 3].
Alarm features were found to have a sensitivity of 89% and specificity of 88% in detecting malignancies among dyspeptic patients. Positive and negative predictive values of alarm features in detecting malignancies were 40% and 98% respectively.

**Discussion**

Normal mucosa or insignificant structural lesions were detected in 58.5% of patients presenting with dyspepsia and 60% of them were younger than 40 years of age. These findings support the use of selective upper GI endoscopy in young patients with dyspepsia as important lesions are less prevalent amongst young persons. Further study is warranted to determine whether young patients with dyspepsia benefit from endoscopy. Unmeasured benefits of an endoscopy in these patients could include an improvement in quality of life, reduced anxiety and reduction in subsequent health care utilization.

The most common structural lesions were gastro-duodenal ulcers and erosions. The relationship between the presence of the above lesions and risk factors were not significant. The impact of smoking and NSAID use depend on factors such as duration, frequency etc, which were not assessed in this study.

Upper GI malignancies were diagnosed among 8.1% of the dyspeptic patients in our study population. Alarm features and the older age group (>50yr) had a significant association with upper GI malignancies in dyspeptic patients. Sensitivity and specificity of alarm features in detecting malignancies were 85-90%. The high negative predictive value of alarm features reflects the low prevalence of malignancies in the population.

**Conclusion**

Alarm features and older age are significant factors to be considered when referring patients for specialist care whilst young patients without alarm features seem to benefit less from early endoscopy. Therefore, the ASGE and NICE guidelines are applicable to our local population, until local guidelines are established. A multi-centre study with a large patient population would provide more comprehensive facts on this matter.

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

**References**


<table>
<thead>
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<th>Groups</th>
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<th>χ² test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Malignant (%)</td>
<td>Benign (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age&gt;50 years (%)</td>
<td>08 (7.2)</td>
<td>46 (41.4)</td>
<td>54</td>
<td>6.348</td>
</tr>
<tr>
<td>Age &lt;50 years (%)</td>
<td>01 (0.9)</td>
<td>56 (50.5)</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>09</td>
<td>102</td>
<td>111</td>
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</tbody>
</table>

Table 3. Relationship between age and upper GI malignancy *Exact significance considered*


Modified suture loop technique for single incision laparoscopic appendectomy (SILA); how I do with conventional instruments

M.S. Faisal, S.D. Muhammad
Sharif Medical and Dental College, Lahore, Pakistan

Key words: Single-incision laparoscopic appendectomy; conventional instruments; saad's loop.

Introduction to modified suture loop (Saad's Loop) technique for SILA

Single incision laparoscopic appendectomy (SILA) is a relatively new procedure for the treatment of acute appendicitis with the benefits of having no visible scar, as the procedure is done through a single incision which remains hidden within the umbilicus [1,2,3].

A simple and innovative suture loop (named Saad's loop) was devised by Dr. Muhammad Saad Faisal, Division of Surgery, Sharif Medical City Hospital, Lahore, Pakistan to make SILA low cost and feasible with conventional instruments. This loop serves to suspend the appendix intracorporeally.

Principle of the technique

1. The principle of SILA is completion of laparoscopic appendectomy via a single transumbilical incision.

2. Saad's loop hangs the appendix and mesoappendix, without passing through any of these structures - key step.

3. Saad's loop technique for SILA eliminates the need for a third port and roticulating instruments to suspend the appendix, making SILA less expensive and feasible with conventional instruments.

Surgical technique

Under general anesthesia, patients are kept in the Trendelenburg position with the left arm tucked on the patient's left side.

1. A 1.5 - 2cm long, crescent shaped skin incision is made along the left side of the umbilicus (Figure 1)

2. A Verres needle is used to generate a pneumoperitoneum. Two 10mm ports are introduced in the linea alba, above and below the umbilicus through already made skin incisions (Figure 2), leaving a fascial bridge between the ports (Figure 3).

3. The laparoscope is introduced through one port, and the grasper through the second port.

4. A non-absorbable suture (polypropylene 2/0) on a straight needle is used to create Saad's loop by introducing it directly into the peritoneal cavity through the skin in the right iliac fossa, bringing the needle inside, holding it with the grasper and reinserting it back into the abdominal wall near the entry point of the needle without passing it through any intra-abdominal structures (Figure 4).
5. The free ends are pulled externally after the appendix is engaged in Saad's loop and are clamped outside separately by two haemostats against the abdominal wall, instead of knotting (Figure 5).

6. In order to engage the appendix in Saad's loop, the grasper is first passed through this loop to grasp the appendix tip (Figure 6).

7. Then it pulls the appendix through this loop (Figure 7).

8. The assistant then holds both ends of the suture tight in haemostats.

9. The mesoappendix is controlled with Liga Clips, applied at its root and is separated from the appendix at the base with scissors or cautery.

10. The base of the appendix is recognized and ligated using extracorporeal knotting with absorbable sutures (Vicryl® 1). A metallic clip is applied opposite to the knot to avoid spillage from the distal end of the appendix while extraction of the specimen (Figure 8).

11. The appendix is then transected between the knot and the clip with laparoscopic scissors.

12. Saad's loop is pulled out to release the specimen.
and it is then retrieved directly through the 10 mm port without using any special equipment (Figure 9).

13. The skin incision is closed with interrupted non-absorbable sutures (Polypropylene 3/0) (Figure 10).

**Discussion**

With the help of the innovative Saad's loop, SILA can be easily performed in developing countries with the advantage of no additional cost to the patients.

The key manoeuvre is the suspension of the appendix within Saad's loop which is readjustable according to the surgeon's desire by simply manipulating and changing the position of the appendix using an ordinary laparoscopic grasper. This simple suture loop obviates the need for a third port, instrument or any special needle. The idea of the suture loop was borrowed from the single incision laparoscopic cholecystectomy where the suture is passed through the fundus of the gall bladder to hitch it against the abdominal wall for retraction [4,5].

The main advantages of the technique are cost effectiveness (only a 2/0 polypropylene suture is required) and feasibility with conventional instruments. It is also based on the principles of a laparoscopic appendectomy and this modified loop serves as a bridge between the conventional laparoscopic surgeries to the single incision laparoscopic surgeries. Previously, an epidural needle based percutaneous suture loop had been devised by Joshi et al to help dissection during conventional laparoscopic appendectomies. However, Saad's loop created with ordinary polypropylene 2/0 on a straight needle is less traumatic, fairly simple and cost effective. It also carries the potential of performing SILA [6].

The authors declare no conflict of interest and the study was conducted in accordance with the ethical standards of the institutional committee and the Helsinki Declaration of 1975, as revised in 2000.

**References**


Case:
A 9 year old girl presented with a history of abdominal pain for 4 days; associated with nausea, vomiting and unopened bowels for 3 days duration. She had a preceding history of non-colicky chronic abdominal pain for 3 months duration associated with chronic constipation where she opens her bowels once in 4 or 5 days. Her growth was within the age appropriate percentiles. She was afebrile with normal cardiorespiratory parameters. Abdomen was soft and non-tender, but there was gaseous distension noted on percussion. Digital rectal examination revealed stools in the rectum. On investigation, full blood count and urinalysis was normal. Erect abdominal x-ray was taken and shown below.

1. What is the radiological abnormality noted (radiological sign)?
2. What are the causes of the above condition?
Large gastrointestinal stromal tumour (GIST) in a young female

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Key words: Gastrointestinal stromal tumour; interstitial cells of cajal; c-kit (tyrosine kinase inhibitor) proto-oncogene

Introduction

Gastrointestinal stromal tumours (GIST) are rare, accounting for less than 1% of primary neoplasms of the gastrointestinal tract. GIST is defined as immunohistochemically KIT-positive and a KIT signalling primary mesenchymal tumour of the gastrointestinal tract (1). The peak incidence of these tumours are in those of age around 60 years (2) and the tumours can range from small benign tumours to malignant ones. This patient was diagnosed at the age of only 23 years, making it a rare presentation.

Case report

A 23 year old previously healthy female presented with a history of abdominal distention and loss of appetite for one month with fever and generalized body swelling for the last three days. On physical examination, she was found to be pale and there was a non-tender large intra-abdominal epigastric mass extending down to the umbilicus. Investigations revealed anaemia (haemoglobin of 7.1 g/dl) and hypoproteinaemia (total protein of 4.9 g/dl, albumin of 2.4 g/dl). An ultrasound scan of the abdomen showed a large solid mass lesion seen in the upper abdomen. The contrast enhanced CT (CECT) scan of the abdomen and pelvis revealed a large intraperitoneal mass (measuring 9.9 cm × 13.7 cm × 15 cm) without obvious vascular infiltration. The mass was compressing a part of the stomach and it was suggested to be an intraperitoneal sarcoma. Upper gastrointestinal endoscopy (OGD) revealed two areas of ulceration at the lesser curvature of the stomach. On exploration, there was a solid mass touching the anterior abdominal wall and arising from the lesser curvature of the stomach, extending to the first part of the duodenum and it was adherent to the capsule of the left lobe of the liver, the transverse mesocolon and the head of the pancreas. A wide local excision was done in the form of a subtotal gastrectomy and partial duodenectomy after freeing the adhesions. A part of the mesocolon also had to be removed. Reconstruction was in the form of the Hofmeister modification of Billroth-II. The post-operative period was uneventful. The patient was discharged with a plan for further follow up by the oncology unit.

Microscopically, a mixed spindle and epithelioid cell neoplasm within the distal stomach and proximal duodenal wall was found with a mucosal resection margin of 9mm and 15mm. These cells had marked focal nuclear pleomorphism, hyperchromasia and mitosis at <5/50 HPF. The lesion involved the submucosal layer, muscle layer and the sub-serosa of the stomach and proximal duodenal wall. Immunohistochemistry staining found that the cells were CD117 and SMA positive, whilst S100 and CK17 negative. The appearances are keeping in with a gastrointestinal stromal tumour of mixed epithelioid and spindle cell type.

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Discussion

The GISTs are the commonest primary mesenchymal tumour of the gastrointestinal tract and are thought to originate from the interstitial cell of Cajal. GISTs usually affect middle aged and older patients; they are rare before the age of 40 years. GIST incidence is equal in both sexes with a slight male predominance (3). Most commonly it originates in the stomach (60%) followed by small intestine (25%), the colon and rectum (5%) and rarely even in at extra-intestinal sites. This case is particularly unusual because of the extremely large tumour size of 9.9 cm × 13.7 cm × 15 cm in a 23 year old female. Other authors have reported a mean GIST size of 6 - 10.6 cm (7). The clinical presentation is non-specific; she had a palpable mass, weight loss and anaemia. About 20% of GISTs are asymptomatic, so the clinical diagnosis of GIST is based on a high index of suspicion. Pre-operative imaging modalities like CECT abdomen and OGD aids in diagnosis. The large lesions show cystic degeneration with central necrosis and ulceration of the overlying mucosa. Microscopically most GISTs consist of a uniform population of spindle cell (70%) and epitheloid type (20%), which typically arise in the stomach. The remaining 10% consist of a mixture of these two morphologies, as in this case (4). They exhibit a spectrum of behaviour from benign to malignant lesions. The incidence of malignancy can be predicted based on the size, site and mitotic count. The easiest applicable morphological criteria to predict tumour behaviour is the size.

Gastric tumours more than 10cm are probably malignant. Gastric tumours of ≤5cm in size and with a mitotic count of ≤5/50HPF are probably benign. Other prognostic variables are high cellularity, coagulative tumour necrosis, pleomorphism, high s-phase fraction and DNA aneuploidy. There were no soft tissue metastasis in this case. Metastasis beyond the abdomen especially to the bone and lungs is uncommon. The similarities of GISTs with a histological picture of gastrointestinal leiomyosarcoma or a poorly differentiated carcinoma may cause a diagnostic dilemma. The immunohistochemical assay for CD117 antigen is the mainstay for definite diagnosis in 95% of GISTs. Other markers which may be positive include CD34 (70%) and smooth muscle actin (SMA) 40%. CD117 positive GISTs should be considered for molecular analysis for the tyrosine kinase inhibitor or platelet derive growth factor receptor (PDGFR) alpha analysis. This is important for the use of the therapeutic tyrosine kinase inhibitor Imatinib mesylate.

The standard treatment of a localized resectable GIST is surgery. Radio therapy is ineffective. The GISTs are surgically managed on the lines of soft tissue sarcomata (STS). The success of imatinib in controlling locally advanced and metastatic GIST has led to the interest in the neoadjuvant and adjuvant use of drugs. The natural history of malignant GISTs is a protracted course with recurrences and metastasis spanning over years, even up to 10 - 20 years (5). Even among low risk GISTs recurrences have been reported up to 20 years after treatment (2). The predictive factors for recurrence are tumour size >5cm.

References

Key Points:

- GISTs are the commonest primary mesenchymal tumours of the gastrointestinal tract.
- The clinical presentation is non-specific, often asymptomatic and has a spectrum of behavior ranging from benign to malignant.
- Histopathology & IHC assay yields the definitive diagnosis.
- Standard treatment is local resection with neo-adjuvant and adjuvant biotherapy.

Answers to images in surgery (Page 31)

1. Chilaiditi sign. (Segment of bowel interposed between diaphragm and the liver).

2. The normal upper abdominal anatomy prevents hepatodiaphragmatic interposition of bowel in a normal person. Any condition that alters the hepatodiaphragmatic recess results in the above findings. These conditions include decreased liver volume, weakness or division of the suspensory ligaments of the liver and ascites or high intra-abdominal fat content. In addition, patients with megacolon or a long, redundant colon with a long, narrow mesentery are at increased risk of developing the condition (congenital anomalies).

Discussion - Chilaiditi sign is an incidental radiologic finding with reported incidence of 0.025% to 0.28% in the general population and an important imitator of free air under the diaphragm in symptomatic patients. This entity is termed Chilaiditi syndrome when associated with vague abdominal pain, distension, vomiting, anorexia and constipation. Lateral decubitus films are helpful in differentiation of pneumoperitoneum from hepatodiaphragmatic interposition since unlike pneumoperitoneum, the “air” will remain in the hepatodiaphragmatic recess.

![Figure 1. At presentation](image1.png)

![Figure 2. Following conservative management after 48 hours](image2.png)

References

A rare case of intra-oral lipoma in a malignant disguise

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Key words: Intra-oral lipomas; mesenchymal neoplasms

Introduction

Lipomas are common mesenchymal neoplasms that rarely occur in the oral cavity. The first description of oral lipomas was given by Roux M [1] in an alveolar mass, which he referred to as a 'yellow epulis'. Oral lipomas which are soft, well circumscribed, mobile, slow growing, and mostly asymptomatic, can occur in major salivary glands, buccal mucosa, lips, tongue, palate and the floor of the mouth. They are benign tumours which progressively increase in size over years. Intra-oral lipomas may cause interference with speech and mastication. The aetiology of a lipoma is uncertain. They make up 4 to 5% of all benign tumours in the body. Involvement of the oral cavity is rare, comprising less than 4.4% of all benign oral soft tissue tumours in the oral cavity. They occur most commonly in the buccal mucosa and the vestibule. Types of lipomas include microscopically simple lipomas, fibrolipomas, spindle cell lipomas, intramuscular infiltrating lipomas, salivary gland lipoma, myxoid lipomas, and atypical lipomas. Lipomas can be complicated by ulceration, bleeding, and rarely, malignant transformation.

Case Report

A 65 year old man presented with swelling in the oral cavity for 4 years which progressively increased in size, with an associated ulcer over the swelling. He was a type 2 diabetic patient on treatment. On examination we observed a 6 x 5 cm swelling in the buccal mucosa on the right side, approximately 1 cm from angle of the lip. The swelling was not tender, was soft in consistency and mobile. An ulcer, 2 x 1 x 0.5 cm, was present over the swelling in the oral cavity. There was no induration around the ulcer and there was no bleeding on touch (Figure 1). A punch biopsy taken from the lesion revealed a microscopic diagnosis of a lipoma with ulceration. There was no malignant change or lymphoproliferative disorder. An excision biopsy was performed (Figure 2) and the final histopathology report was of a benign lipoma of the oral cavity.

Discussion

Lipomas of the oral cavity are relatively rare adipose mesenchymal neoplasms composed of mature fat cells...
Intra-oral lipomas though rare, commonly occur in the buccal mucosa. The clinical features of lipomas vary according to their rate of growth, size and location. The usual complaint is of a painless palpable mass, and there is seldom dysfunction of an involved muscle. A characteristic feature is a change in consistency and form of many of these lesions during contraction of the involved muscle. The tumour is soft and flat when the muscle is relaxed and becomes firm and more spherical when the muscle contracts. Lipomas consist of mature fat cells arranged in lobules that are separated by septa of fibrous connective tissue. Liposarcoma is important in the differential diagnosis, because well differentiated liposarcomas often contain many areas of lipomatous tissue. These sarcomas are characterized by areas of lipoblastic proliferation, myxoid differentiation, cellular pleomorphism, increased vascularity, and mitosis [3]. Surgical excision is the treatment of choice in all cases. The histopathological features of an intra-oral lipoma are not different from normal mature fat tissue [4].

References

1. Roux M. On exostosis; their character. *Am J Dent Sc* (1848); 9: 133-134

Key Points:

- Intra-oral lipomas though rare, commonly occur in the buccal mucosa.
- Most lipomas develop in the subcutaneous tissues, but deeper tissues may be involved too.
- Complete surgical resection is the main treatment which should be performed to avoid recurrence.
Intracranial injury in a child following a dog bite to the head

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Keywords: Dog bite; intracranial injury; child

Introduction

Being bitten by a dog bite is still a significant public health problem. The significance of this problem is emphasised by the 20,802 children aged below 17 years being admitted to hospitals in Sri Lanka in 2010 [1]. Skull fractures caused by dog bites are rare and only a small number of cases have been reported in the world literature, and this is noted to be mainly in the paediatric population. Such a case has not been reported in Sri Lanka before.

Case Report

In December 2013, a previously fit and healthy 20-month-old boy was admitted to the Lady Ridgeway Hospital (LRH) after initial treatment at a local hospital after being bit by a dog. At the time of admission the duration from the dog bite was 8 hours. The dog was a domestic pet and had been vaccinated in a timely fashion. There was no history of a fall, loss of consciousness or bleeding from the ear, nose or throat.

On examination there was a deep laceration over the left eyelid and a 1cm scalp laceration on the left occipital area and few superficial abrasions to the nose [Figure 1]. He was fully conscious and there were no focal neurological signs.

The scalp wound was cleaned and dressed at the accident and emergency ward of the LRH and the child was transferred to the National Eye Hospital where he underwent wound debridement and suturing of the left eyelid laceration. He was then transferred back to LRH.

On the 2nd day it was observed that the dressing over the scalp wound was soaked with a slightly blood-stained watery discharge. The skull X-ray showed a depressed fracture in the occipital bone. The CT scan of the head confirmed a depressed fracture of the occipital bone of greater than 1cm impinging on the left cerebellar hemisphere (Figure 2).

Figure 1. Scalp laceration on the occipital area

Figure 2. Depressed fracture of the occipital bone impinging on left cerebellar hemisphere

The patient was transferred to the Neurosurgical Unit of...
the National Hospital where he underwent a minicraniotomy and elevation of the depressed fracture with repair of the dural defect. He was transferred back to LRH for convalescence and made an uneventful recovery.

**Discussion**

The most common sites of injury caused by dog bites in children are the face, head and neck accounting for nearly 80% of cases [2, 3]. Children younger than 3 years of age are susceptible because of their smaller size, greater head to body ratio, extreme curiosity and poor defending ability [4, 5]. In one study, authors reviewed 16 case reports of dog bite related intracranial injury in children [4] and among those patients, five (30%) were not diagnosed at initial presentation as in this case.

Most of the children where intracranial injury was not diagnosed initially were fully conscious and had no neurological symptoms or signs that may have alerted the health care team [4, 5].

Relatively innocuous looking scalp lacerations can cause an underestimation of the depth and severity of the injury. On the other hand, underlying bone injury may be missed during the first clinical examination as a consequence of the temporary displacement of the scalp by the force of the bite, so that the intracranial penetration can occur at some distance from the scalp laceration [5]. This warrants thorough clinical examination of the area surrounding the scalp injuries, if possible retracting the scalp laceration.

Intracranial infection is one of the major complications that might lead to neurological consequences [2, 4, 5]. Cerebrospinal fluid leakage associated with dural tears is considered a major risk factor for infection. Dog bite wounds are contaminated by aerobic and anaerobic microorganisms mainly representing canine intra-oral flora and skin flora [2, 5]. Taking this into consideration these children will require appropriate antibiotic management, and follow-up review. It is also essential that on admission the child's tetanus status is ascertained and appropriate treatment be given as these are contaminated wounds.

**References**


**Key Points:**

- Dog bites on the scalp in children can be associated with intracranial injury.
- A high degree of clinical suspicion and appropriate use of imaging are needed to avoid delayed or missed diagnosis.
- When diagnosed, early management is required to avoid meningitis and associated complications.
A rare case of an extra-intestinal gastrointestinal stromal tumour of the sigmoid mesocolon presenting as haemoperitoneum

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Keywords: Gastrointestinal stromal tumour, sigmoid mesocolon; haemoperitoneum

Introduction

Gastrointestinal stromal tumours (GIST) are rare and account for 0.1% - 3.0% of all gastrointestinal neoplasms [1]. However, extra-intestinal GIST constitutes up to 10% of cases [2]. Majority arise from the soft tissue of the abdominal cavity whilst the remainder arises from the retroperitoneum. Sites for extra-intestinal GIST includes the mesentery, omentum, peritoneum, gallbladder and liver [3-5]. Although stromal tumours in the gastrointestinal tract commonly metastasize to the omentum and mesentery, they may also occur as primary tumours outside the gastrointestinal tract, especially in the omentum and the mesentery [3]. Very rarely these tumours may present as a haemoperitoneum in an emergency setting. We report an unusual case of spontaneous rupture of a sigmoid mesocolonic GIST presenting as a haemoperitoneum in a 17 year old boy.

Case Report

A 17-year-old boy presented with acute onset abdominal pain and a drop in haemoglobin levels. Physical examination revealed tachycardia with a pulse rate of 124 beats per minute, blood pressure of 100/70 mmHg. His abdomen was mildly distended with mild tenderness and rebound tenderness in both iliac fossae. Peristaltic sounds were diminished. His blood count demonstrated a haemoglobin of 7.4 g/dl, haematocrit 31% and white blood count 18,000 cells/ml. CT scan revealed a 5 x 5 cm mass in the sigmoid mesocolon along with moderate haemoperitoneum [Figure 1 and 2]. Along with this, the patient had multiple congenital cardiac anomalies to the extent of being advised to undergo a cardiac transplant.

Pre-operative transfusions were given and the patient was taken to the operating room for an emergency exploratory laparotomy. Intra-operatively about 500ml...
of blood with clots was removed and there was a solid tumour of 5 x 5 cm involving the sigmoid mesocolon. Excision of the tumour with a 2 cm margin was done, without any bowel compromise. Biopsy confirmed that the mass was a GIST. The tumour cells were immunoreactive for the KIT protein (CD117), CD34 and Discovered on GIST-1 (DOG-1). The patient was recovering well post-operatively for the first 24 hours and there was no further drop in haemoglobin. Drain output was non haemorrhagic.

Unfortunately, the patient died on day two post-operatively due to sudden cardiac arrest because of his underlying cardiac disease.

Discussion

Gastro-intestinal stromal tumour (GIST) appears to arise from the interstitial cell of Cajal, but the exact cell of origin and precise steps in tumour genesis are not well established [2]. GISTs are commonly found in the stomach, followed by the small intestine, colon, rectum and oesophagus [6]. Extra-intestinal GIST express CD117 (c-kit receptor)(100%), CD34 (50%), neuron specific enolase (44%), smooth muscle actin (26%), desmin (4%), and S-100 protein (4%). In our case tumour cells were immunoreactive for the KIT protein (CD117), CD34, Discovered on GIST-1 (DOG-1), and the mitotic rate was 10/50HPF. In relation to GIST, the symptoms of obstruction, bleeding, or rupture are less common. Our patient presented with haemoperitoneum, but the exact incidence of spontaneous rupture of a mesocolonic GIST has not yet been quoted conclusively.

References


Key Points:

- Extra gastrointestinal stromal tumours are neoplasms located outside the gastrointestinal tract in sites such as the omentum, mesentery and retroperitoneum.
- GISTs of the mesocolon are rare with only a few cases noted in the literature.
- It is a rare clinical entity that infrequently presents with spontaneous haemoperitoneum and emergency treatment should be sort for resolution of the haemoperitoneum.
Getting started with Minimally Invasive Pancreaticoduodenectomy: Is it worth it?
Liang S, Jayaraman S.

Background
This study evaluates the safety and cost of introducing minimally invasive pancreaticoduodenectomy (MIPD) to a surgeon's practice.

Methods
All MIPDs performed between December 2011 and July 2013 were compared with open pancreaticoduodenectomy (OPD) cases by the same surgeon. The primary outcomes were mortality, major morbidity, and re-operation. Secondary outcomes were perioperative and oncologic outcomes and cost. MIPD include total laparoscopic pancreaticoduodenectomy (TLPD) and laparoscopic-assisted pancreaticoduodenectomy (LAPD), where a small incision is used for reconstruction. Bivariate comparisons of outcomes were performed using nonparametric tests.

Results
In total, 44 pancreaticoduodenectomies were performed: 15 MIPDs (2 TLPDs and 13 LAPDs) and 29 OPDs. One death occurred in each group. Major complication rates were not significantly different (33% for MIPD versus 17% for OPD); however, there was a trend toward more re-operation after MIPD compared with OPD (20% versus 3%; P=.07). The incidence of pancreatic leak (20% for MIPD versus 14% for OPD), biliary leak (0% versus 7%, respectively), abscess formation (27% versus 14%, respectively), and intra-abdominal haemorrhage (13% versus 3%, respectively) were not significantly different. MIPD achieved equivalent oncologic outcomes as OPD with 100% R0 margin and adequate lymph node retrieval. There was no statistical difference in median operative time (342 minutes for MIPD versus 358 minutes for OPD), length of stay (8 versus 9 days, respectively), operating room expenses (Canadian) ($7246.0 versus $6912.0, respectively), or total cost (Canadian) per case ($15,034.0 versus $18,926.0, respectively).

Conclusions
MIPD and OPD had similar safety and cost in this introductory series. However, a trend toward a higher rate of re-operation for pancreatic leak suggests the need for caution in introducing this novel technique.

Commentary
K. B. Galketiya
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This article retrospectively compares pancreaticoduodenectomy performed by laparoscopy; LPD (15 patients) and open surgery (29 patients) by a single surgeon. The number of patients in each group is different and there is no randomization. However, it is clear that in a centre experienced in open pancreaticoduodenectomy shifting to a laparoscopic technique is possible. The shift to laparoscopy may be a sequential pathway with conversions at the beginning. However, whether this shift is of value is not supported by this study. The mortality is one for each group but as a percentage it is 7% for laparoscopy and 3% for open. The major complication rate is mentioned as not significantly different (33% for MIPD versus 17% for OPD), but laparoscopy patients have a higher incidence of intra-abdominal haemorrhage and the re-operation rate is a concern. The oncological outcome and hospital stay are comparable.

A review of eight articles with a total of 492 patients published by Merkow J et al. concludes decreased blood loss, longer operative time, similar post-operative complication rate, decreased pain, and shorter hospital length of stay for LPD. There was also increased number of lymph nodes harvested and similar margin free resections with LPD, favouring LPD.

It is important that the introduction of the laparoscopic technique for pancreaticoduodenectomy should be with caution and not at the expense of patient safety.
Adjuvant bisphosphonate treatment in early breast cancer: meta-analyses of individual patient data from randomised trials
Early Breast Cancer Trialists’ Collaborative Group (EBCTCG)

Abstract

Summary

Background bisphosphonates have profound effects on bone physiology, and could modify the process of metastasis. We undertook collaborative meta-analyses to clarify the risks and benefits of adjuvant bisphosphonate treatment in breast cancer.

Methods

We sought individual patient data from all un-confounded trials in early breast cancer that randomised between bisphosphonate and control. Primary outcomes were recurrence, distant recurrence, and breast cancer mortality. Primary subgroup investigations were site of first distant recurrence (bone or other), menopausal status (postmenopausal [combining natural and artificial] or not), and bisphosphonate class (amino bisphosphonate [e.g.: zoledronic acid, ibandronate, pamidronate] or other [i.e. clodronate]). Intention-to-treat log-rank methods yielded bisphosphonate versus control first-event rate ratios (RRs).

Findings

We received data on 18,766 women (18,206 [97%] in trials of 2-5 years of bisphosphonate) with median follow-up 5.6 woman-years, 3453 first recurrences, and 2106 subsequent deaths. Overall, the reductions in recurrence (RR 0.94, 95% CI 0.87–1.01; 2p=0.08), distant recurrence (0.92, 0.85–0.99; 2p=0.03), and breast cancer mortality (0.91, 0.83–0.99; 2p=0.04) were of only borderline significance, but the reduction in bone recurrence was more definite (0.83, 0.73–0.94; 2p=0.004). Among premenopausal women, treatment had no apparent effect on any outcome, but among 11,767 postmenopausal women it produced highly significant reductions in recurrence (RR 0.86, 95% CI 0.78–0.94; 2p=0.002), distant recurrence (0.82, 0.74–0.92; 2p=0.0003), bone recurrence (0.72, 0.60–0.86; 2p=0.0002), and breast cancer mortality (0.82, 0.73–0.93; 2p=0.002). Even for bone recurrence, however, the heterogeneity of benefit was barely significant by menopausal status (2p=0.06 for trend with menopausal status) or age (2p=0.03), and it was non-significant by bisphosphonate class, treatment schedule, oestrogen receptor status, nodes, tumour grade, or concomitant chemotherapy. No differences were seen in non-breast cancer mortality. Bone fractures were reduced (RR 0.85, 95% CI 0.75–0.97; 2p=0.02).

Interpretation

Adjuvant bisphosphonates reduce the rate of breast cancer recurrence in the bone and improves breast cancer survival, but there is a definite benefit only in women who were postmenopausal when treatment began.

Commentary

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Bisphosphonate therapy has long been a mainstay in the treatment of established metastatic bone disease, with multiple beneficial effects including reduction of fracture risk, control of bone pain and treatment of hypocalcaemia. In breast cancer, bisphosphonate therapy has been efficacious in reducing osteoporosis and fracture risk especially in post-menopausal women with ER positive disease.

Recent trials have examined the potential of prophylactic bisphosphonate therapy in reducing breast cancer recurrence in bone, thereby improving survival. Evidence from these have been mixed, with some reports suggesting potential value in early breast cancer although others such as the AZURE trial found no benefit in more advanced disease.

The present paper is a meta-analysis which assesses data from 26 randomized trials involving over 18,000 women with early breast cancer, comparing the use of adjuvant bisphosphonate therapy with controls, looking at local and distant recurrence and overall survival.

The authors report that the data shows highly significant reduction only in bone recurrence, and not in other breast cancer outcomes. They further state that the subgroup analyses suggested benefit in just postmenopausal women, among whom there were
highly significant reductions not only in bone recurrence but also in any distant recurrence and overall survival. The authors speculate that the lack of efficacy seen in pre-menopausal women may be due to the inhibition of bisphosphonate therapy by reproductive hormones.

The results of this analysis have significant implications for the management of early breast cancer in post-menopausal women. Hitherto use of bisphosphonate therapy was restricted to the prevention of bone loss and fractures in such patients treated with aromatase inhibitors. These results suggest an added oncological benefit which may warrant its use in a wider range of patients. In relative terms however this survival benefit may have limited value in a country like Sri Lanka. For example, the pooled data suggest that after 10 years, 14.7 percent of postmenopausal women who used a bisphosphonate died from breast cancer, versus 18.0 percent of women who did not use the drug.

Where adjuvant bisphosphonate therapy have cost implications in a developing country like Sri Lanka, such a small increment in survival may not be adequate to justify widespread use.

Renal tumor biopsy for small renal masses: A single-center 13-year experience

Background
Renal tumour biopsy (RTB) for the characterization of small renal masses (SRMs) has not been widely adopted despite reported safety and accuracy. Without pre-treatment biopsy, patients with benign tumours are frequently overtreated.

Objective
To assess the diagnostic rate of RTBs, to determine their concordance with surgical pathology, and to assess their impact on management.

Design, setting and participants
This is a single-institution retrospective study of 529 patients with biopsied solid SRMs, 4 cm in diameter. RTBs were performed to aid in clinical management.

Outcome measurements and statistical analysis
Diagnostic and concordance rates were presented using proportions. Factors that contributed to a diagnostic biopsy were identified using a multivariable logistic regression.

Results and limitations: The first biopsy was diagnostic in 90% (n = 476) of cases. Of the non-diagnostic biopsies, 24 patients underwent a second biopsy of which 83% were diagnostic. When both were combined, RTBs yielded an overall diagnostic rate of 94%. Following RTB, treatment could have been avoided in at least 26% of cases because the lesion was benign. Tumour size and exophytic location were significantly associated with biopsy outcome. RTB histology and nuclear grade were highly concordant with final pathology (93% and 94%, respectively). Adverse events were low (8.5%) and were all self-limited with the exception of one. Although excellent concordance between RTB and final pathology was observed, only a subset of patients underwent surgery following biopsy. Thus it is possible that some patients were misdiagnosed.

Conclusions
RTB of SRMs provided a high rate of diagnostic accuracy, and more than a quarter were benign. Routine RTB for SRMs informs treatment decisions and diminishes unnecessary intervention. Our results support its systematic use and suggest that a change in clinical paradigm should be considered.

Commentary
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A renal mass with greatest dimension ≤ 4cm falls in to the definition of small renal mass (SRMs). Small renal masses account for nearly one-half of all newly diagnosed renal masses, largely based on an incidental diagnosis during widely used abdominal imaging. The incidence of small renal masses is on the rise due to the increased rate of detection. In many series, 30% of small renal masses are of benign histology, hence intervening for all SRMs has a significant risk of overtreatment and
treatment associated complications.

Prediction of histological diagnosis based on clinical features or imaging is not always accurate. On the other hand, renal tumour biopsy is historically poorly accepted mainly due to the fear of tract seeding, poor diagnostic accuracy and biopsy related complications. The debate on the disadvantages and advantages of renal mass biopsy continues despite emerging results supporting the latter. In previous series, the rate of false negative results was considered to be as high as 18%, merely due to the fact that centrally located tumours were not accurately targeted and material obtained in such attempts were not sufficient enough to arrive at a reasonable histological diagnosis. The risk of clinically significant complications of renal tumour biopsy such as perinephric bleeding and pneumothorax are reported to be low (<1%), and needle tract seeding is extremely rare when centrally located, infiltrative renal masses are excluded. Availability and suitability of a wide variety of treatment options ranging from active surveillance and minimally invasive interventions (radiofrequency and cryo-ablation) to surgery for many patients with small renal masses, further highlights the importance of pre-treatment renal mass biopsy in current day practice.

The main drawbacks preventing the recommendation of small renal mass biopsy in routine clinical practice and standard urology guidelines are the paucity of studies with large numbers focusing on the subject, and the sustainability and reproducibility of their results over a sufficient length of time. Therefore the current study with 529 patients over a period of 13 years is of significant value addressing the above mentioned limitations in previous studies.

Long-term results of carmustine wafer implantation for newly diagnosed glioblastomas: a controlled propensity-matched analysis of a French multicenter cohort
Johan Pallud et al.
Neuro Oncol. 2015; 17:1609-19.

Background
The standard of care for newly diagnosed glioblastoma is maximal safe surgical resection, followed by chemoradiation therapy. We assessed carmustine wafer implantation efficacy and safety when used in combination with standard care.

Methods
Included were adult patients with (n = 354, implantation group) and without (n = 433, standard group) carmustine wafer implantation during first surgical resection followed by chemoradiation standard protocol. Multivariate and case-matched analyses (controlled propensity-matched cohort, 262 pairs of patients) were conducted.

Results
The median progression-free survival was 12.0 months (95% CI: 10.7–12.6) in the implantation group and 10.0 months (9.0–10.0) in the standard group and the median overall survival was 20.4 months (19.0–22.7) and 18.0 months (17.0–19.0), respectively. Carmustine wafer implantation was independently associated with longer progression-free survival in patients with subtotal/total surgical resection in the whole series (adjusted hazard ratio [HR], 0.76 [95% CI: 0.63–0.92], P = .005) and after propensity matching (HR, 0.74 [95% CI: 0.60–0.92], P = .008), whereas no significant difference was found for overall survival (HR, 0.95 [0.80–1.13], P = .574; HR, 1.06 [0.87–1.29], P = .561, respectively). Surgical resection at progression whether alone or combined with carmustine wafer implantation was independently associated with longer overall survival in the whole series (HR, 0.58 [0.44–0.76], P < .0001; HR, 0.54 [0.41–0.70], P < .0001, respectively) and after propensity matching (HR, 0.56 [95% CI: 0.40–0.78], P < .0001; HR, 0.46 [95% CI: 0.33–0.64], P < .0001, respectively). The higher postoperative infection rate in the implantation group did not affect survival.

Conclusions
Carmustine wafer implantation during surgical resection followed by the standard chemoradiation protocol for newly diagnosed glioblastoma in adults resulted in a significant progression-free survival benefit.

Commentary
Ruvini Abeygunaratne
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Hope Hospital, Manchester,
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The results of this French multicentre study reinforces the significant progression-free survival benefit of carmustine wafers. The wafers are inserted after total/subtotal resection of newly diagnosed glioblastomas and the standard treatment was then implemented. The use of carmustine wafers has not been popular due to the risk of infection being higher and it is reassuring to know that the high postoperative infection rate in the implantation group did not affect the survival. Extent of surgical resection again proved to be a key independent factor in determining long term progression free survival.

This study raises the question as to whether the use of carmustine wafers should be part of the standard care when treating newly diagnosed glioblastomas.
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