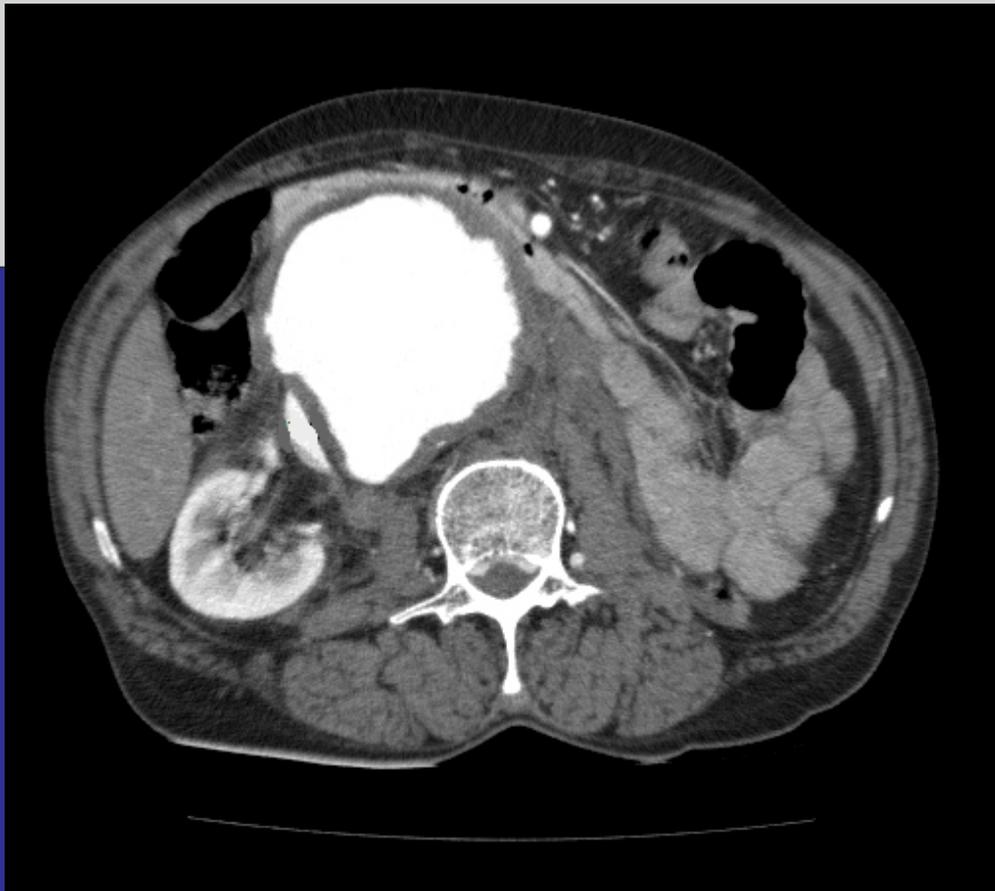




# THE SRI LANKA JOURNAL OF SURGERY

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## In this issue

- Barrett's oesophagus
- Management of the injured hand
- Hypercholesterolaemia in patients with symptomatic gallstones
- Intercostal drainage following thoracoscopic lymph node biopsy
- Rectus abdominis muscle cube to seal presacral haemorrhage

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## Sri Lankan research output

Research is defined as “investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws” [1]. Martyn Shuttleworth defines it more simply as “gathering of data, information and facts for the advancement of knowledge” [2]. While the benefits of scientific research to a country is self evident, the SCImago Journal and Country Rank, a country indicator of research output based on the Scopus® database lists Sri Lanka in 82<sup>nd</sup> position from a total of 229 countries for the year 2013 [3]. The contribution from medical researchers in Sri Lanka to global research output has been only 0.086% in the decade 2000-2009 [4]. The interest and participation in research activities remains low and some of the possible reasons for this within the medical field may be the lack of direct benefit especially in “non academic” institutions; a sense that it is purely an academic exercise with no real practical implications; the lack or limitations of resources including financial, human and technical, to conduct research.

However, the simplest research processes such as auditing, can initiate direct and beneficial effects in clinical settings [5]. Studies such as the one which has been cited, could be carried out with limited resources and funding, by trained and committed researchers. Editorial boards of journals have also realised the dilemma among practising clinicians who may be disillusioned by scientific articles which they perceive to have no or minimal direct relevance to practice. For example, international journals such as the Journal of Clinical Urology which is a clinically oriented journal, attempt to provide its potential authors with a more clinically based platform for research publication.

The university systems and the government of Sri Lanka have initiated incentives for individuals with a view of promoting research output, including research allowances and promotion benefits. Creation of a “research culture” during primary education, and also during the undergraduate and postgraduate years is crucial for a definitive change. This should, hopefully, lead to more interest and funding for research and development.

**Ajith Malalasekera**

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## Barrett's oesophagus: where are we now?

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**Key words:** Barrett's oesophagus; columnar lined oesophagus; gastro-oesophageal reflux disease; oesophageal adenocarcinoma.

### Abstract

With the high prevalence of gastro-oesophageal reflux disease, the incidence of oesophageal adenocarcinoma is increasing in many parts of the world, particularly in the West. Therefore, recognition of Barrett's oesophagus, its premalignant stage, has become important in the management of gastro-oesophageal reflux disease. This review focuses on the evolution of knowledge since the first description of the columnar lined oesophagus, the current status and controversies surrounding Barrett's oesophagus, and problems associated with its management.

### Introduction

The incidence of gastro-oesophageal reflux disease (GORD) and its complications has been rising in many parts of the world, particularly in developed Western populations, similar to other life-style related diseases such as cardiovascular diseases, type-2 diabetes and metabolic syndrome [1,2]. Moreover, in the long-term GORD is known to produce oesophageal adenocarcinoma, through its premalignant stage, Barrett's oesophagus.

An increase of epidemic proportions has been observed in the USA, where from the mid 1970's the incidence of oesophageal adenocarcinoma has steadily risen to surpass the incidence of oesophageal squamous cell carcinoma; the relative incidence of oesophageal adenocarcinoma (adenocarcinoma per squamous cell carcinoma x 100) in the USA has risen from 23.9%

during 1976-1987 to 158% in 2002 [2]. In developed Asian countries such as Singapore, Japan and Taiwan, although squamous cell carcinoma is still the most common type of oesophageal malignancy, adenocarcinoma has shown an increasing trend [3]. In Sri Lanka, according to the National Cancer Control Programme data, the relative incidence of oesophageal adenocarcinoma has risen from 8% to 14% during the period 2000 to 2005 [3]. At our institution, the relative incidence of oesophageal adenocarcinoma has risen from 1.8% during 1991-1993 to 11.6% during 2012-2013 [4].

The sequence of events from GORD to oesophageal adenocarcinoma are as follows:

GORD → Barrett's oesophagus → Dysplasia  
→ Adenocarcinoma

However, despite the high prevalence, the lack of clear understanding has resulted in multiple ways of management of GORD and Barrett's oesophagus. Here, we take a closer look at the changing knowledge of Barrett's oesophagus since its description in the 1950's and discuss the present status of the disease.

### Evolution of the concept of Barrett's oesophagus

Around the mid twentieth century, some surgeons observed the presence of a columnar lined tubular structure distal to the squamous lined oesophagus, and there were descriptions of ulcers in this area. In 1950, Norman Barrett, a renowned British surgeon, defined the oesophagus as the part of lower oesophagus which is lined by squamous epithelium and described the distal columnar lined structure as tubular stomach which had been pulled up due to a congenitally shortened oesophagus [5]. However, in 1953, Allison and

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Johnstone identified that the region which Barrett described as “tubular stomach” did not have a peritoneal lining and gastric type musculature but comprised oesophageal type submucosal glands [6]. These authors suggested that Barrett's description of the “tubular stomach” was part of the oesophagus lined by “gastric type membrane” [6]. In 1957 Barrett acknowledged that Allison and Johnstone were correct and agreed to the term columnar lined lower oesophagus [7]. However, Barrett, Allison and Johnstone yet believed that the columnar lining in the oesophagus was congenital. Later, Barrett began to believe less in his congenital theory and stated that “if the cardiac valve of a normal person were to become incompetent and if the lower oesophagus were, as a result, to be bathed for a long time by digestive gastric juice, the squamous epithelium could be eaten away and totally replaced by columnar cells” [7]. Subsequent studies by Moersch et al. in 1954 suggested that the columnar lined oesophagus (CLO) was metaplastic, and was due to gastro-oesophageal reflux [8, 9]; this was confirmed by Bremner et al. in 1970 [9].

In 1961, Hayward described that the normal gastro-oesophageal junctional region was lined by a non-specialized mucin secreting columnar epithelium he termed as junctional mucosa, and hence, it was normal to have the lower 1 -2 cm of the oesophagus lined by glandular mucosa [7]. As a result, presence of a columnar lined oesophagus (CLO) up to 2cm was regarded as normal and a length of at least 3cm above the gastro-oesophageal junction was required to make a diagnosis of CLO. This was, until the concept of short segment Barrett's oesophagus was put forward based on work by Spechler et al. in the 1990's [11]. Notwithstanding the work by Spechler, the 3cm rule and the use of the term junctional mucosa to describe the cardiac mucosa found at the lower oesophagus are still used in practice by some surgeons and pathologists.

Since the late 1950's CLO was commonly referred to as Barrett's oesophagus without an indication of prognostic significance, a practice that is still continued by some. Paull et al, in 1976, described the histology of CLO as fundic (present term oxyntocardiac mucosa), junctional (cardiac mucosa) and specialized type (intestinal metaplasia) [12]. The significance of these

epithelial types was not evident until Haggitt suggested that intestinal type metaplasia in the CLO increased the risk of adenocarcinoma, an observation which was later confirmed by many others [13 -16]. Afterward, the terms CLO and Barrett's oesophagus were not recommended to be used synonymously instead, Barrett's oesophagus was used to define the CLO which meant that this part of the oesophagus bore a significantly increased risk of progression to adenocarcinoma. Hence, the Practice Parameters Committee of the American College of Gastroenterologists, in its 1998 statement, defined Barrett's oesophagus as the presence of endoscopically visible CLO within the oesophagus, which on biopsy, was confirmed to have intestinal metaplasia [17].

### **Where are we now?**

It is now known that the normal oesophagus is entirely lined by squamous epithelium and the presence of columnar lining in any part of its length indicates metaplastic changes due to reflux induced damage. The CLO may contain three types of metaplastic glandular tissue: cardiac mucosa (CM)– composed of non specialized mucus secreting columnar cells, oxyntocardiac mucosa (OCM)– a mixture of non specialized cells and oxyntic cells and intestinal metaplasia (IM)– composed of goblet cells.

### **Definition of Barrett's oesophagus**

It is now universally accepted that, of the three metaplastic glandular tissue types in the CLO, intestinal metaplasia – the most unstable, carries a significant risk of progression to adenocarcinoma. Early studies have reported risk of adenocarcinoma levels as high as 2 -4% per year. However, currently, the widely accepted risk level is 0.5% per year (1 in 200 patients with Barrett's oesophagus will develop oesophageal adenocarcinoma each year). This data was derived from a large meta-analysis after adjusting for possible confounding factors [18, 19].

Currently, there is a belief that metaplastic cardiac mucosa, per se, without intestinal metaplasia can also predispose to malignancy. Such belief is based on similar molecular changes seen in intestinal metaplasia as is in cardiac mucosa. Furthermore, there are reports of

gastro-oesophageal resection specimens with malignancy without intestinal metaplasia in the adjacent non-neoplastic tissue [18]. However, the role of these shared molecular changes in the neoplastic progression is not known. It is also known that with malignant progression intestinal metaplasia often becomes replaced by dysplastic or neoplastic tissue. Furthermore, even if CM carries a risk for development of malignancy, the magnitude of the risk is not known [18]. Therefore, in the latest 2011 American Gastroenterologist Association (AGA) position statement on Barrett's oesophagus, presence of cardiac mucosa lined oesophagus without intestinal metaplasia has not been considered a significant risk factor for malignancy owing to insufficient evidence [20]. The definition of Barrett's oesophagus in the 2011 AGA position statement is as follows:

“Barrett's oesophagus is the condition in which any extent of metaplastic columnar epithelium that predisposes to cancer development replaces the stratified squamous epithelium that normally lines the distal oesophagus. Presently, intestinal metaplasia is required for the diagnosis of Barrett's oesophagus because intestinal metaplasia is the only type of oesophageal columnar epithelium that clearly predisposes to malignancy.”

By contrast, the 2013 British Society of Gastroenterologist (BSG) guidelines have acknowledged that the evidence favouring cardiac mucosa alone as a significant risk factor for development of malignancy is weak, nevertheless stating that “the presence of intestinal metaplasia is not a prerequisite for the definition of Barrett's oesophagus, but should be taken into account when deciding on clinical management” [21].

Treating CM without IM, as a premalignant condition despite the lack of awareness of its real risk can have the following consequences: 1) CM is an extremely common finding in CLO and if all those having CM are to undergo intense surveillance as for a premalignant condition it will add a huge workload and cost to the health care services. 2) Labeling a patient as having a premalignant condition can cause significant psychological stress and have a considerable economic and social impact on the individual.

Of the three metaplastic epithelial types in the CLO, oxyntocardiac mucosa (OCM) is the most stable epithelial type and is not associated with malignant progression [22]. According to the authors' experience, in Sri Lanka where the prevalence of oesophageal adenocarcinoma is low, compared to the West, oxyntocardiac mucosa is very common in the columnar line mucosa and intestinal metaplasia is rather uncommon (unpublished data).

### **Where is the gastro-oesophageal junction?**

According to the 2011 AGA position statement “The diagnosis of Barrett's oesophagus can be suspected when, during endoscopic examination, columnar epithelium is observed to extend above the gastrooesophageal junction (GOJ) into the tubular oesophagus” [20], but the reliability of endoscopic identification of the GOJ remains unclear.

In the West, the most commonly used endoscopic landmark for the GOJ is the proximal limit of the gastric rugal folds. However, the proximal limit of gastric rugal folds are subjected to change constantly with respiration, gut motility and the degree of abdominal distension [18]. Furthermore, Chandrasoma et al. have proposed that when the lower oesophageal sphincter is damaged, which is a constant observation in GORD, the distal intra-abdominal part of the oesophagus dilates due to negative pressure and assumes gastric like contours and even develops rugal folds. Also, when this dilated part of oesophagus becomes lined by metaplastic columnar epithelium as seen on endoscopy, it becomes practically impossible to differentiate lower oesophagus from the proximal stomach; he called this the dilated distal oesophagus (DDO) [23]. Accordingly, the landmark of proximal limit of the rugal folds becomes even more unreliable in patients with GORD.

In Asia, especially East Asia, the distal limit of the palisade veins located in the distal oesophageal mucosa is commonly used as the landmark for GOJ [18]. However, the anatomical relationship of these palisade veins with the GOJ has not been proven and visualization of these veins with precision becomes difficult with oesophagitis [18]. This means that the two most commonly used endoscopic landmarks for the GOJ in the world are flawed. While acknowledging the

limitations of currently used landmarks, for want of a better landmark, both AGA and BSG guidelines recommend continued use of proximal limits of the gastric rugal folds as the endoscopic landmark of GOJ [20, 21].

### **Short segment Barrett or intestinal metaplasia of cardia?**

According to the widely held belief, short segment Barrett's and IM of the cardia are two disease entities with different aetiopathogeneses, i.e., short segment Barrett is due to GORD and IM of cardia is due to *Helicobacter pylori* infection [24]. Given the unreliability of the endoscopic landmarks of the GOJ, it is difficult for the endoscopist to reliably differentiate short segment CLO from the proximal stomach. Histologically, oesophageal origin of a mucosal biopsy can be reliably identified by the presence of submucosal glands or their ducts. If IM is seen in the presence of these structures the diagnosis of Barrett's oesophagus may be made reliably. Since studies have shown that such indicators of oesophageal origin are present in only about 10 – 15% of cases, reliable histological diagnosis of short segment Barrett's can be made only occasionally [21]. The other useful indicators of oesophageal origin of a biopsy are multilayered epithelium at the squamo-columnar junction and squamous islands within the glandular tissue [25]. BSG 2013 guidelines suggest that “diagnosis of Barrett's oesophagus should take into account the degree of confidence based on a combined analysis of endoscopic and histopathological criteria” [21]. Considering the unreliability of the endoscopic landmarks of GOJ in GORD patients, the practical relevance of this statement in a diagnosis of short segment Barrett becomes questionable.

### **Could the gastro-oesophageal junction be defined histologically?**

The first attempt of histological definition of GOJ was made by Norman Barrett when he defined the oesophagus as the part lined by squamous epithelium and the stomach as the part lined by columnar epithelium [5]. Later, it became understood that this definition, which may hold true for the normal oesophagus, cannot be applied to reflux damaged

oesophagus.

Recently, Chandrasoma et al. proposed that the cardiac mucosa, which is believed to be the normal mucosal lining of the proximal stomach (cardia), is not a normal epithelium but a metaplastic epithelium that lines the lower oesophagus due to reflux induced damage [25 – 30]. According to him the erroneous belief of CM lining the proximal stomach is due to the lack of awareness of the existence of a dilated distal oesophagus which we recognize as the cardia [23]. The true proximal stomach is lined by oxyntic mucosa. According to this hypothesis, GOJ can be histologically defined, and in a normal person without reflux damage, it is the junction between the squamous epithelium and oxyntic mucosa. In those with reflux induced damage GOJ is the junction between CM and oxyntic mucosa or the OCM and oxyntic mucosa. He further proposed the term squamo-oxyntic gap to histologically define the CLO. Accordingly, the columnar epithelial types (CM, OCM and IM) between the squamous epithelium and oxyntic mucosa are metaplastic due to reflux induced damage and are oesophageal in origin [31]. Based on this theory, the presence of CM in a biopsy always indicates oesophageal origin and presence of IM admixed with CM indicates Barrett's oesophagus; thus the term IM of cardia becomes obsolete. Furthermore, adenocarcinoma arising from the GOJ and cardia are oesophageal in origin and are due to GORD. However, this theory has not yet gained wide acceptance and is practiced only in a few tertiary care centres treating GORD in the USA and in Europe.

Epidemiological studies have shown that oesophageal, junctional and proximal gastric/cardia adenocarcinoma demonstrate a similar rising pattern, whereas distal gastric carcinoma shows a declining incidence [32, 33]. Clinical features of adenocarcinoma around the GOJ have been shown to be similar and different to distal gastric carcinoma [34, 35]. Furthermore, *H. pylori* infection, which is the most common aetiological agent for distal gastric carcinoma has been shown not to be associated with cardia and junctional adenocarcinoma [36–38]. These observations are in favour of the view of a common aetiopathogenesis for adenocarcinoma arising around the “GOJ”.

### **Does the length of CLO matter?**

Traditionally, Barrett's oesophagus was divided into short segment Barrett (<3cm) and long segment Barrett. Accordingly, adenocarcinoma of the gastro-oesophageal junctional region is believed to arise from the short segment Barrett [11]. However, both short segment and long segment Barrett are managed similarly [20,21].

The prevalence of IM appears to increase with the length of the CLO [18, 21, 31]. In one series all CLO more than 5cm in length had IM [30]. When IM is not evenly distributed it is more likely to be found in the most proximal regions in the CLO [22,31]. Therefore, when obtaining biopsies from CLO it is important to include biopsies from the most proximal regions of CLO, preferably, straddling the squamo-columnar junction. The cancer risk also appears to increase with the extent of the columnar metaplasia. Therefore, both AGA and BSG guidelines recommend systematic recording of the circumferential extent and maximum extent of metaplasia in endoscopic reports using a methodology such as the Prague criteria [20, 21, 39].

### **Natural history of Barrett's oesophagus**

As mentioned earlier the presence of IM in the oesophagus carries a 0.5% per year risk of progression to adenocarcinoma through dysplasia. Therefore, in patients identified to have Barrett's oesophagus surveillance for dysplasia is recommended [20, 21]. Histologically, dysplasia is graded as low grade dysplasia and high grade dysplasia. A meta-analysis in 2008 reported the risk of adenocarcinoma in those who had high grade dysplasia (without prevalent cancer at the time of diagnosis) as 6.6% per year [40]. The risk of cancer with low grade dysplasia has not been defined with certainty. Some studies have shown no increased risk than those who have IM alone while others have shown an increased risk [18]. The main reason for this discrepancy is high inter-observer variability, hence low reproducibility, of histological diagnosis of low grade dysplasia [20, 41, 42]. The difficulty in differentiating between reactive changes associated with inflammation and low grade dysplasia is the main cause for this. It has also been widely observed that those cases with Barrett's oesophagus with low grade dysplasia do not often show

dysplastic changes in subsequent biopsies. It is not clear whether this is because low grade dysplasia is commonly reversible or there is an over-diagnosis of reactive changes. Another problem with dysplasia assessment is the diagnosis of "indefinite for dysplasia" with which further management options become questionable. Although use of a molecular marker, which correctly predicts the risk of malignant progression, seems to be the answer to these problems, there are no validated biomarkers available to assess the progression of malignancy in Barrett's oesophagus. Therefore, despite the mentioned limitations with the histology the general recommendation for surveillance of Barrett's oesophagus is endoscopic and histological assessment [20, 21]. To minimize inter-observer variation it is recommended that all suspected dysplasia should be confirmed by a second pathologist [20, 21].

Although it has been proven that IM in CLO increases the risk of progression to malignancy, whether increased surveillance of Barrett's oesophagus reduces the morbidity and mortality is not proven. The general recommendation by popular guidelines is to perform surveillance endoscopy and biopsy at intervals of 3 to 5 years for patients who have Barrett's oesophagus without dysplasia, 6 to 12 monthly for those found to have low-grade dysplasia, and every 3 months for patients with high-grade dysplasia who receive no invasive therapy (the exact time periods vary in different guidelines) [18]. Both AGA and BSG guidelines recommend "The Seattle protocol" for obtaining surveillance biopsies, i.e., 4 quadrant biopsies from every 1 – 2 cm of the CLO (1cm biopsies if dysplasia is suspected). In addition, areas of mucosal irregularity (nodules, masses, ulceration etc), which are more likely to be associated with dysplasia, should be sampled separately [20,21]. Studies have proven that such rigorous surveillance protocols increase the detection of high grade dysplasia and invasive malignancy [43, 44].

### **Conclusion**

More than 60 years after the beginning of the discussion on Barrett's oesophagus, there remains considerable confusion and controversy. There is no universal agreement on fundamental issues like the definition of Barrett's oesophagus, normal anatomy and histology of

the GOJ. It is likely that the very high prevalence of gastro-oesophageal reflux related changes in the GOJ, especially in the Western populations where most studies have been conducted, have blurred the line between normal and abnormal and contributed to this confusion.

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## **Management of the injured hand - Principles of assessment**

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**Keywords:** Hand injury; vascular injury; tendon; nerves

### **Introduction**

The hand is an organ whose parts affect its entire function. Hand injury patterns are innumerable, vary widely and are a common presentation in an emergency department. The aim of this 3 part article series is to highlight the general principles that can be applied to many injuries. Assessment is based purely on a comprehensive knowledge of hand anatomy and its functional implications.

Hand injuries occur frequently in the young and the economically productive group with a male preponderance [1]. Industrial and agricultural injuries, home accidents and injuries sustained due to interpersonal violence are among the foremost causes. Even though the injury may appear trivial to the layman, in the long-term, the actual damage and functional impairment could be debilitating. While time away from work and the resulting economic loss is significant following an injury as minor as a crushed fingertip, mutilating hand injuries constitute a real challenge as many would not return to pre-injury functional status. Hence the priority is to achieve maximal hand function in the shortest possible time. In this regard, the expertise of the treating surgeon is critically important in determining the overall outcome.

A comprehensive history and meticulous hand examination based on its anatomy is the key to identifying injured structures prior to surgical exploration. It is common practice to ask the patient about the dominant hand, but in actual fact, both hands

are equally important irrespective of an individual's status or occupation, as many basic human requirements are successfully fulfilled with the help of both hands. Details of the mechanism of injury are a vital factor that guides peri-operative decision making, which is also a predictor of long-term outcome. The extent of tissue damage and loss is greater in crush injury or in blast injury compared with incised injuries, hence the likelihood of poorer outcomes are significantly higher. In addition, the degree of expected contamination and timing of definitive repairs or reconstructions would depend primarily on the mechanism of injury.

The hand is often subjected to trauma, with a varying degree of damage. Meticulous assessment based on its anatomy and function is the key to successful surgical repair. Surgical exploration without methodical preoperative examination, can potentially lead to incomplete reconstruction. Repeated and delayed explorations are strongly associated with poor outcome especially in flexor tendon injuries [2].

### **Assessment of tissue viability**

Vascular assessment is the priority in assessing the injured hand. The extent of the vascular injury and the duration of ischaemia determine if the injured part can be salvaged. The vascular status of an injured digit is assessed by inspection of the colour, capillary refill and capillary bleeding. A vascularized finger will appear pink, with capillary refilling time of between 1 and 2 seconds. By contrast, a pale hand with delayed or no capillary refill indicates arterial insufficiency. Also, exceptionally brisk capillary refill in a finger with a dusky appearance may indicate venous congestion. Often, in industrial and agricultural injuries, the injured hands are covered with dirt, which interferes with

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vascular assessment while hand vascular assessment in individuals with dark skin and thickened skin may be inaccurate. It is important to appreciate that, even in a completely devascularized finger, stagnant blood beneath the fingernail can be moved with compression mimicking capillary refill. A reliable indicator in these doubtful situations is to assess capillary bleeding from tissue following a needle prick. Here a bright pink or red bleed indicates healthy tissue, while dark, brisk bleeding following pin-prick indicates venous congestion. Clinical assessment of distal pulse is mandatory and can be aided with a hand held Doppler instrument. Compartment syndrome is not uncommon especially following crush injuries and high suspicion of such combined with timely release of pressure is vital to maintain tissue viability. Tissues affected most by compartment syndrome are nerves and the intrinsic hand muscles [3].

#### **Soft tissue assessment, the nail bed and fingertip**

The skin over the dorsal aspect of the hand is lax and stretchable. The relative mobility of the dorsal skin over the extensor tendons, facilitate the movement of the joints. In the oedematous hand, this tissue layers become stiff limiting the finger flexion. The unique skin on the palmar aspect is fixed to the palmar fascia by the fibrous septa. The fibro-fatty subcutaneous layer in the palm acts as a cushion, while the fixity limit the relative mobility of the palmar skin. The extent and nature of the traumatized soft tissue is assessed carefully, with a plan for tissue replacement if there is an expected defect in the cover. In sharp cut injuries as with glass, knife or blades, there is hardly tissue loss but such injuries notoriously transect everything down to bone through a small wound in the skin. On the other hand, moving machinery or the impact of blunt objects crushing and tearing soft tissue causes mechanical destruction of tissue. Such tissue loss is further enhanced by tissue ischaemia following disruption of small blood vessels in the zone. Careful clinical observation of dermal capillary bleeding is the key to determine viability.

The tip of the finger is a unique anatomical structure and is the “eye” in the hand (Figure 1). Crush injuries involving the fingertip are relatively common in small

children and young workers who handle pressing and fast moving machines. In such injuries, the nail plate is often avulsed and a distal phalanx fracture is invariably associated with nail bed injury. It is common practice to remove the partially avulsed nail in the emergency room, but this can be utilized by the reconstructing surgeon. Tissue loss is carefully analyzed as the reconstructive technique is dependent on the pattern of tissue lost [4, 5]. Crushed finger tips should not be amputated by an inexperienced operator, as the majority may be saved.

#### **Assessment for nerve damage**

Evaluation of injured nerves is particularly important as missed nerve injuries are not uncommon in our practice. Both sensory and motor function should be assessed prior to anaesthesia as the ends of injured nerves are not easily identified by the occasional hand surgeon - each finger receives two digital nerves which must be tested separately by using light touch. It is essential to compare the injured with the uninjured side and also to test both ulnar and radial borders of the finger separately. Questions that must be asked of the patient are; whether sensation is “normal” as in the uninjured hand or if sensation is “different to what it feels as normal in the normal hand”. This step is essential as digital nerve damage may not cause absolute anaesthesia in the

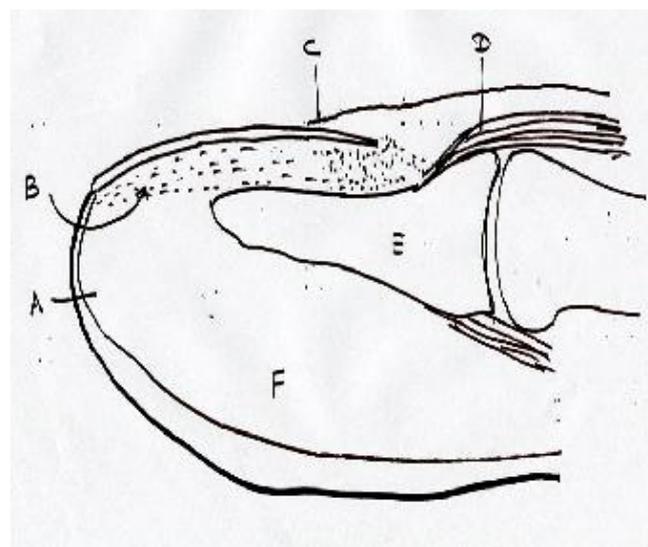


Figure 1. Anatomy of the fingertip. A. Hyponychium, B. Nail bed, C. Eponychium, D. Terminal tendon insertion, E. Distal phalanx, F. Pulp

distribution. In the case of injuries in the palm the territory supplied by the common digital nerves are evaluated. If the injury is more proximal, individual nerves must be assessed. For the median nerve, sensation of the volar aspect of thumb, index and middle fingers and for the ulnar nerve, the volar aspect of the little finger is tested. The first dorsal web space sensation should be tested for the radial nerve. Classic hand postures have been described in association with main nerve injuries, and to the experienced clinician, serve as “spot diagnoses”. For example, radial nerve damage results in loss of active dorsiflexion of the wrist (wrist drop), and inability to extend the fingers and thumb (Figure 2). The classic posture of ulnar nerve damage is the 'ulnar claw hand', with hyperextension at metacarpophalangeal joint (MCPJ) and flexion of the proximal and distal interphalangeal joints (IPJ) of the ring and little fingers (Figure 3). Froment's sign indicates paralysis of adductor pollicis and the first dorsal interosseous muscles, which are supplied by the ulnar nerve (Figure 4a). The “pointing index finger”, when the patient attempts to flex all the fingers is the classic posture in median nerve injury (Figure 4b). The degree of the deformity following major nerves varies depending on the level of the injury [6, 7,8].

### Assessment of Tendon injury

#### Flexor tendons

The normal cascade of the hand is lost in complete injury to tendons. Flexor tendon injury may be suspected by the appearance of the finger posture with the tenodesis effect, when flexing and extending the wrist passively. The fingers assume an extended posture with passive flexion of the wrist while passive extension at the wrist flexes the fingers. In addition, manual compression of the flexor muscle bellies in the forearm causes the fingers to flex, and disruption of the sequential finger flexion in such situations implies flexor tendon injury. These maneuvers are particularly useful in examining a patient who is unable to cooperate with an instructed tendon examination. Children and unconscious patients may be assessed in such manner with reasonable accuracy.

The diagnosis and treatment of tendon injuries require

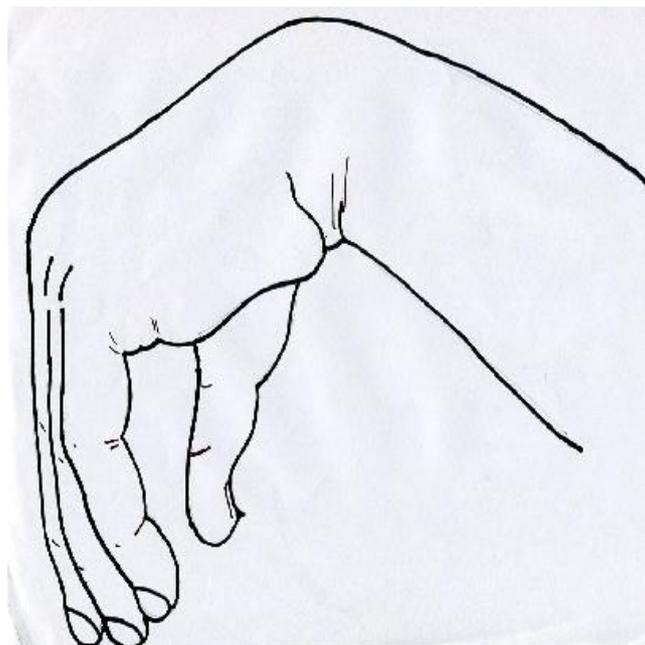


Figure 2. Wrist drop: patient is unable to actively dorsiflex at the wrist; active extension of the finger and thumb is lost.

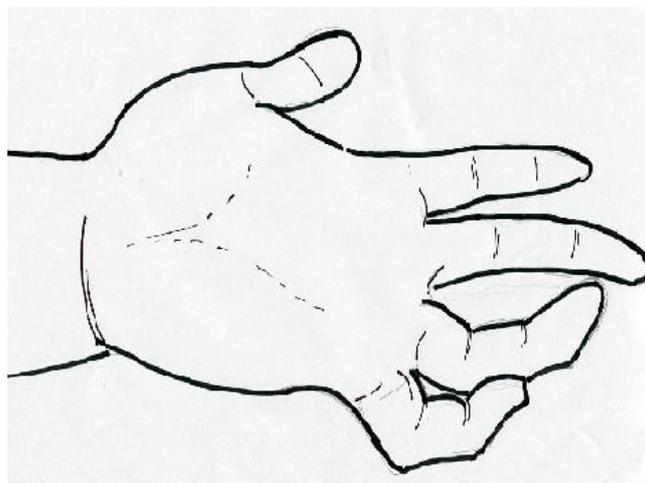


Figure 3. Ulnar claw hand with hyperextension of the metacarpophalangeal joint and flexion of the inter-phalangeal joint.

comprehensive understanding of the structure and function of tendons. Skill on the part of the treating surgeon is vital from the time of examination to the completion of rehabilitation. In the forearm, the flexor muscles are arranged in three layers. The deepest layer is formed by flexor digitorum profundus (FDP), flexor pollicis longus (FPL) and pronator quadratus. In this layer the FDP to the ring and little finger is innervated by the ulnar nerve and the rest by the anterior interosseous nerve. The flexor digitorum superficialis (FDS) forms

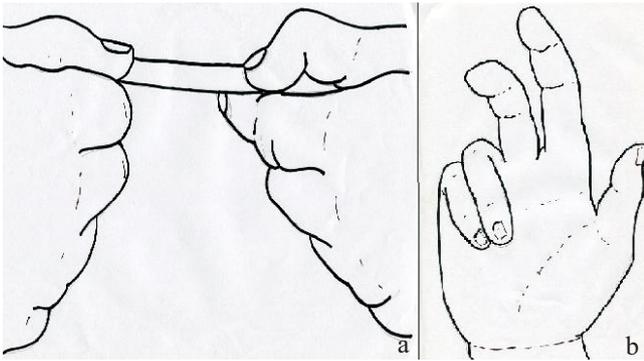


Figure 4a. Froment's sign: The patient is asked to pinch a sheet of paper between thumb and index. With paralysis of the first dorsal interosseous and adductor pollicis, significant flexion at the interphalangeal joint of the thumb results from the flexor pollicis longus action which replaces the adductor pinching.

Figure 4b. The patient is asked to flex all the fingers. With median nerve injury, the patient flexes ring and little fingers with the action of ulnar innervated flexor digitorum profundus and ulnar two lumbricals. The patient will not be able to flex the index and middle fingers. Thus, the patient displays a claw shape, where the little and ring fingers and flexed, the index and middle fingers extended.

the intermediate layer which is innervated by the median nerve which runs along its deep surface. The superficial layer consists of flexor carpi radialis (FCR), flexor carpi ulnaris (FCU), pronator teres and palmaris longus. The FCU is innervated by ulnar nerve and the rest of the superficial layer innervation is by the median nerve.

Nine tendons of long finger flexors pass through the carpal tunnel along with the median nerve. The FPL is the radial most while all FDP tendons are posterior to the FDS. The middle and ring finger FDS tendons are superficial to the other two FDS tendons. In the finger, these tendons travel within a synovial lined fibrous flexor sheath. The pulley system in the fibrous flexor sheath is a unique anatomical structure which prevents bowstringing of the tendons. These are named annular (A 1 to A 5) and cruciate (C1 to C3) pulleys (Figure 5). The A 2 and A 4 pulleys, at the level of proximal and middle phalanges respectively, are the most important functionally. In exploring and repairing flexor tendons maximal preservation of these pulleys should be a priority. The flexor tendon is divided in to five zones for the management and academic purposes(Figure 6). Zone 1 is distal to the FDS tendon insertion and contains

only the FDP tendon. Zone 2, also known as “no man's land”, starts from the A 1 pulley. Both FDP and FDS tendons lie in zone 2, which is the most crowded place in the flexor sheath. Potential for adhesion formation, preventing tendon gliding is common in zone 2. The point at which the lumbricals originate from the FDP is taken as the commencement of zone 3. Zone 4 is within the carpal tunnel. From the muscular tendon junction to the proximal carpal tunnel is zone 5. Being inserted on to the volar aspect of the distal phalanx, the FDP is the only tendon that will allow flexion of the distal interphalangeal joint (DIPJ). In testing, the examiner should immobilize the proximal interphalangeal joint (PIPJ) in full extension, and ask the patient to flex the distal phalanx (Figure 7). All fingers in the injured hand should be examined individually. The FDS tendon inserts into the volar aspect of the middle phalanx. In testing FDS it is mandatory to block the action of common bellied FDP tendon by blocking the DIPJ flexion of 2 or 3 fingers. Accordingly, the patient is asked to flex the finger while the examiner holds the other fingers in extension(Figure 8). In the index finger the FDP muscle belly may have independent control and

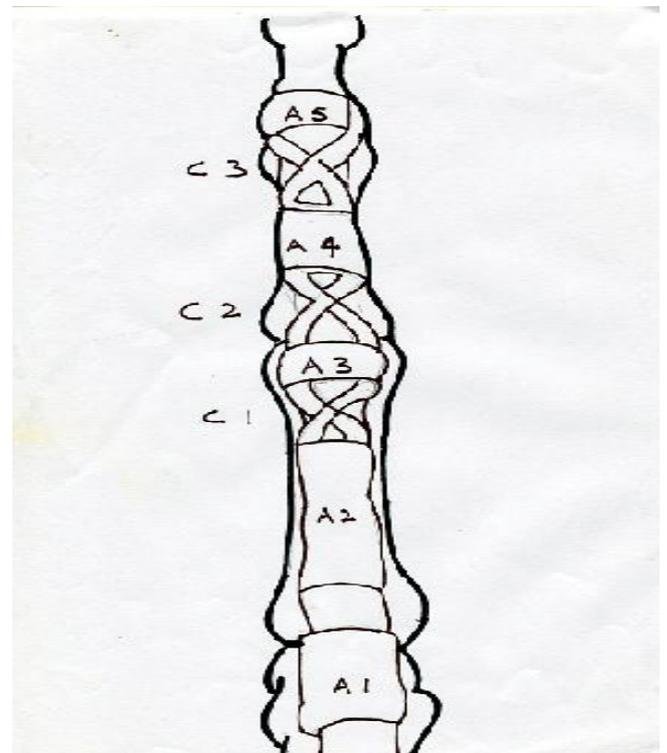


Figure 5. Fibrous flexor sheath and its condensations forming annular and cruciate pulleys. Annular pulleys are named as A 1 to A 5. Cruciate pulleys are named as C 1 to C 3.

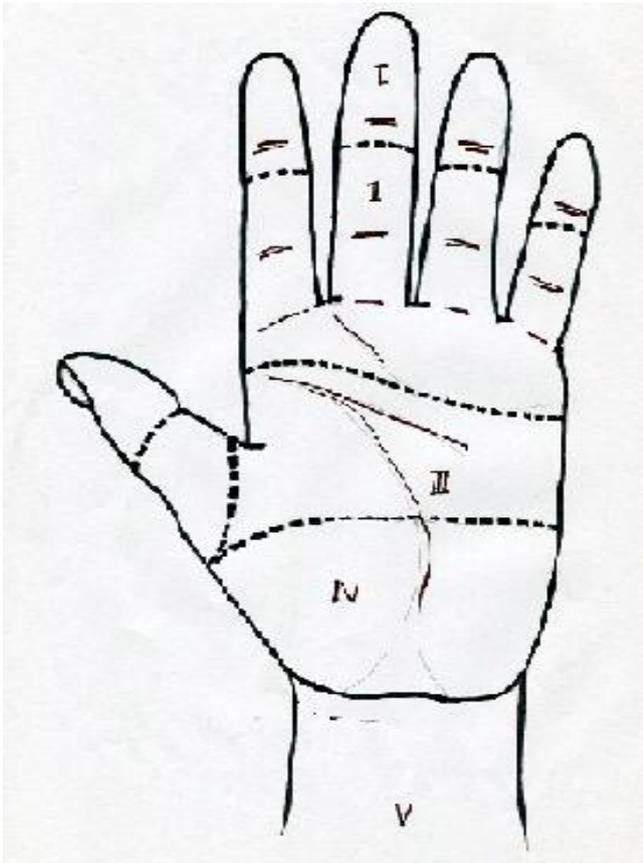


Figure 6. Flexor system is divided into five zones for descriptive purposes.

in this situation FDS is tested by asking the patient to press the pulp of the index finger against the pulp of the thumb. The thumb has one flexor tendon; the flexor pollicis longus (FPL), and is tested by flexing the interphalangeal joint of the thumb [9,10,11].

### Extensor tendons

Extensor tendons are susceptible to injuries as they lie subcutaneous in the dorsum of the hand. Even though the extensor tendons have not attracted the same degree of attention as the flexor tendons, anatomically and mechanically, they are complex structures. The post repair rehabilitation varies according to the zone of injury and delayed reconstruction is challenging especially in zone III. Extensor tendons are thin and flat over the phalanges, making the standard core suture technically impossible. The three wrist extensors; the extensor carpi radialis longus and brevis are inserted on to the bases of second and third metacarpals while the extensor carpi ulnaris tendon is inserted on to the base of

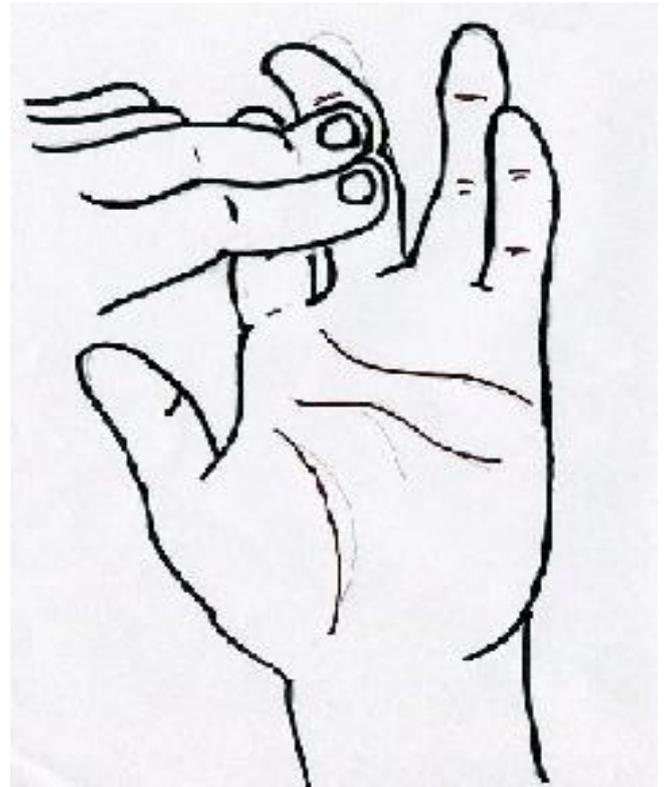


Figure 7. Testing the integrity of flexor digitorum profundus.

fifth metacarpal. Extensor digitorum communis (EDC) provides tendons to each finger while extensor indicis proprius and extensor digiti minimi extends index and little finger respectively, the action independent of EDC. The thumb receives extensor pollicis longus which is the only extensor at the interphalangeal joint of the thumb. Extensor pollicis brevis is a muscle which cannot be tested in isolation. The radial nerve or its continuation, the posterior interosseous nerve, is the responsible motor supply of the whole group of extensor muscles [12].

Under the extensor retinaculum, these tendons are arranged in six fibrous compartments on the dorsal aspect of the wrist (Figure 9). Over the dorsum of the hand, fibrous bands called juncturae tendinae, connect the extensor tendons. The significance is that some degree of finger extension is preserved if the EDC is injured proximal to the juncturae. Sagittal bands maintain the central position of the extensor tendon over the MCPJ. Further distally, the tendon becomes a flat structure and divides into central slip and lateral bands, which receives tendons of the intrinsic hand muscles.

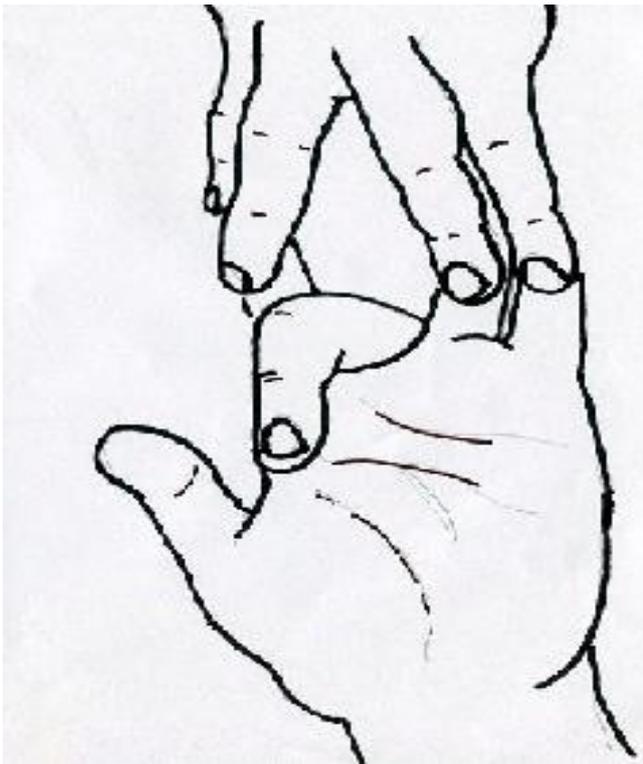


Figure 8. Testing the integrity of flexor digitorum superficialis.

The terminal tendon is formed by the two lateral bands and inserts on to the base of the distal phalanx forming the extensor of the DIPJ. Thus, injury to the terminal tendon results in mallet finger. Following injury to the central slip, loss of extension at the PIPJ can occur, and the finger may develop a boutonniere deformity with time. Elson's test is reliable in testing the central slip, where the patient is asked to extend at the passively flexed PIP joint. In central slip injury, extension at the PIPJ is lost but extension is felt at the DIPJ. Extensor tendon injuries are also classified into zones from 1 to 9 [13,14, 15] (Figure 10).

#### Assessment of muscular skeletal framework

Skeletal framework and its soft tissue attachments of the digits vary from each other [16]. The thumb is responsible for about 40-50 % of the overall hand function [17]. Thenar muscles are responsible for the wide range of movements of the thumb. The ulnar two fingers are mobile and generate more force for the grip, in relation to radial two fingers which provides stability. The thenar and hypothenar muscle groups are

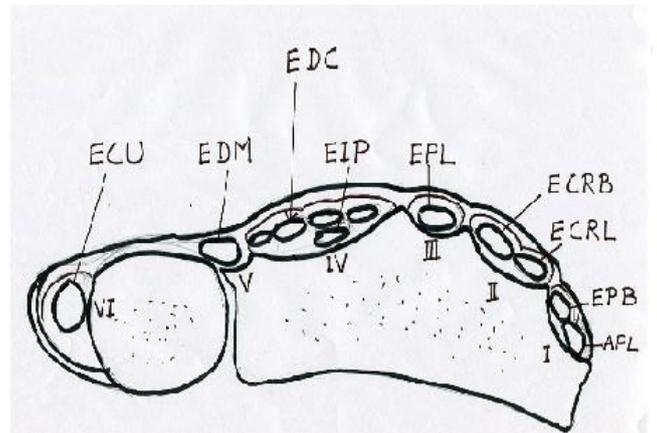


Figure 9. Extensor tendons are arranged into six compartments over the dorsum of wrist.

responsible for their specialized movements. The wide range of mobility of the thumb is largely due to the action of these short but powerful muscles. The four dorsal and three palmar interossei and the four lumbricals form the intrinsic muscles of the hand. These intrinsic muscles provide tendinous contributions to the extensor expansion. The interossei control finger abduction and adduction, and flexion of the MCPJs. The lumbricals are the main extensors of the interphalangeal joints, and flex the MCPJs. Lumbricals are unique in structure, innervation and function, hence probably important in fast, alternating movements and fine-tuning digit motion [18, 19]. The function of the hand is described in terms of the grips.

Assessment of the posture or the attitude of the hand is very informative to the clinician. Obvious deformities as rotation, angulation, overriding or shortening should signify an underlying fracture, dislocation or a ligamentous injury. The likelihood of fracture being an open injury is higher as the soft tissue cover over the hand bones and joints is considerably thin. Most bones are subcutaneous. Muscle bellies are attached only to the metacarpals. Due to the superficial nature of the joints, they are at greater risk of penetrating injuries resulting in septic arthritis. Puncture wounds, particularly human and animal bites, especially on the dorsal aspects should not be neglected. Details of these skeletal injuries are assessed with plain radiographs.

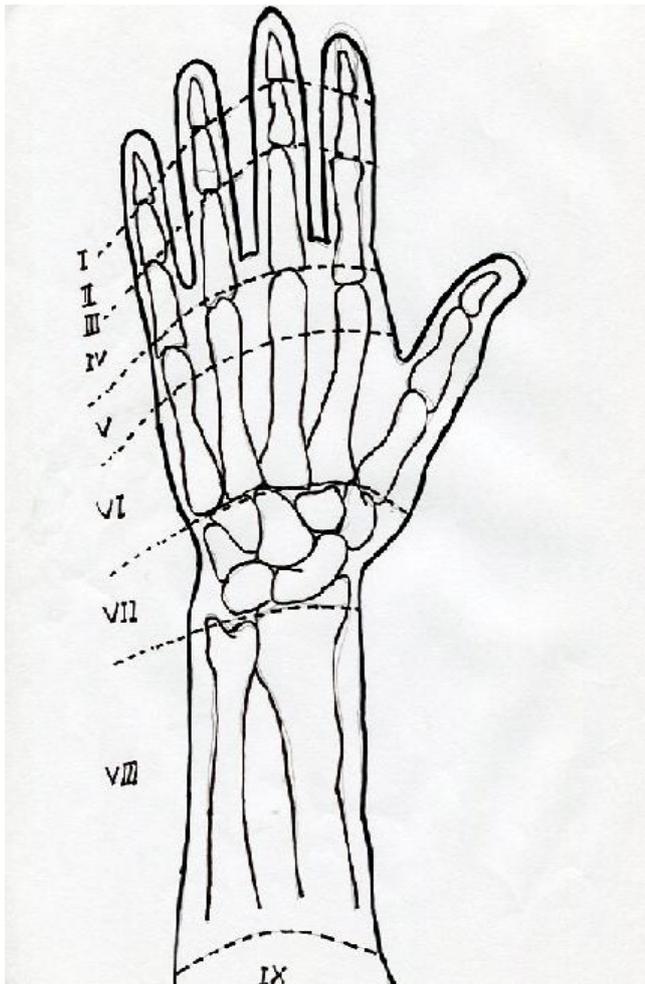


Figure 10. The extensor system is divided into nine zones.

### Initial care at the emergency unit.

Some of the movements and manoeuvres that are described above can be painful to assess. Local anaesthetic blocks are useful to alleviate pain, and should be utilized after assessing the nerves. It is mandatory to document all findings, and in the case of sensation, to map the pattern of sensory loss in a diagram. Current technology with digital photography and smart phones are useful aids in documentation and communication with a more experienced hand team. Attention to these in the emergency departments can obviate the need for repeated and painful dressing removal for the purpose of examination. If the primary treating health team is not in a position to perform an adequate initial evaluation, the hand should be covered in a loose and easily removable dressing. Acute bleeding is often the case at initial presentation - direct firm

pressure and elevation is the key to achieving haemostasis in the emergency room. Application of constricting tourniquets and attempts to blindly apply haemostatic clamps must be avoided at all times as these may cause more harm.

Delayed presentations are a management challenge. Injuries with open wounds are often accompanied with tissue loss, oedema, infection and granulation tissue formation. Reconstruction of an inflamed hand is difficult and invariably leads to a poor outcome. Granulation tissue is replaced by a scar and is the enemy of the supple and moving hand. Myostatic contractions of the muscle will shorten the effective length of the musculotendinous units hindering primary repair in delayed cases. Complex injuries should ideally be managed in specialized units, to ensure restoration of useful hand function [20]. There is a significant difference between hand salvage with preserved function versus amputation or a functional deficit.

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## Hypercholesterolaemia in patients with symptomatic gallstones

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**Keywords:** Gallstones; hypercholesterolaemia; cholecystectomy

### Abstract

#### Objective

To determine the incidence of hypercholesterolaemia in patients with symptomatic gallstones

#### Methods

This is a descriptive observational study. Preoperative serum cholesterol level of patients admitted for surgical removal of the gall bladder to a single surgical unit was studied.

#### Results

There were 33 patients with a median (range) age of 47 (32 - 74) years. 6 (18.18%) patients were known to have hyperlipidaemia and 12 (36%) patients were newly found to have high serum cholesterol levels: 5 (15%) were less than 40 years old. The lowest recorded cholesterol level was 118 mg/dl (normal <200 mg/dl).

#### Conclusions

More than 50% of patients with symptomatic gallstones have hypercholesterolaemia.

#### Introduction

Gallstone disease is common in Sri Lanka. Although there are anecdotal reports of the high incidence of hypercholesterolaemia among patients with symptomatic gallstones, little published data is available on this subject. Cholesterol is exclusively excreted in bile and it is also known that cholesterol is a

constituent of gallstones [1, 2]. Therefore, it seems logical to assume that patients with hypercholesterolaemia may form gallstones more frequently than those with normal serum cholesterol, and this would be reflected in a higher incidence of hypercholesterolaemia among patients with symptomatic gallstones. In this study, we analyzed the levels of serum cholesterol in patients with symptomatic gallstones, awaiting elective surgery.

#### Material and Methods

Patients with symptomatic gallstones, who were admitted to a single surgical unit for elective surgery from November 2010 through January 2012, were included in this study. Patients with haemolytic disorders, common bile duct stones, common hepatic duct stones and obstructive jaundice were excluded from the study. Blood samples were obtained following a prescribed fast before operation. Analysis of serum cholesterol level was performed at the biochemistry laboratory of the Colombo South Teaching Hospital.

#### Results

The total number of patients included in this study was 33 and the mean age was 48.75 years. The median (range) of the serum total cholesterol was 220 mg/dl (118.2 mg/dl - 284.1 mg/dl). Of 33 patients, 18 (54.5%) had a higher than normal serum cholesterol level, 6 (18%) were known to have hyperlipidaemia and 12 (36%) were newly found to have high cholesterol levels. 5 (15%) of 18 patients were less than 40 years old.

#### Discussion

Cholesterol is exclusively excreted via bile. Cholesterol concentration in bile is considered to be the main pathological determinant of stone formation. [1,2].

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Epidemiological studies done in Taiwan described no relationship between hypercholesterolaemia and gallstones, whereas some other studies showed that hyper-triglyceridaemia decreased sensitivity of the gallbladder to cholecystokinin (CCK) and increased the risk of stone formation. [3,4].

In this study, just over one half of patients had high serum cholesterol levels compared with 45% of patients with symptomatic gallstones in whom serum cholesterol was within the normal range. It would therefore appear that patients with normal serum cholesterol levels too are at risk of developing gallstones. The safe maximum serum cholesterol level associated with a zero risk of developing gallstones has not been defined thus far, although in this small observational study all patients had serum cholesterol levels higher than 118.2mg/dl. It seems that a large multi-centric study including ultrasound examination of an asymptomatic control population would be necessary to define a serum cholesterol level above which gallstones are likely to occur.

In this study we found over one half of patients who had high serum cholesterol levels, just over one third had a diagnosis of hypercholesterolaemia newly found and one sixth were young patients less than 40 years of age. It is reasonable to suggest that all patients with gallstones other than known causes, such as haemolytic disorders, have their serum cholesterol levels estimated. This would help to find and treat their hyperlipidaemia, which if undetected, may have other cardiovascular health consequences.

There are several mechanical and molecular factors that influence the excretion of cholesterol. Experiments on mice suggest that transport factors murine protein kinase, apolipoprotein E, fibrates, and dietary factor capsaicin have some influence on cholesterol excretion in bile and an effect on stone formation(4,5,6). Biliary tract obstruction is the commonest mechanical factor, and that was excluded in this study. However, exclusion of abnormalities of molecular factors such as transport proteins murine protein kinase, apolipoprotein E were not feasible given the limited resources available to us.

In addition, statins and fibrates too are known to

influence cholesterol excretion – statins, in particular, decrease cholesterol saturation in bile (7). Despite regular use of statins, a small proportion of patients in this study were found to have gallstones.

## Conclusion

More than one half of patients with symptomatic gallstones had higher than normal serum cholesterol levels in this observational study of a small cohort of patients. Serum cholesterol estimation in patients with symptomatic gallstones may help find new cases of hypercholesterolaemia. The level of serum cholesterol beyond which individuals risk development of gallstones is yet to be determined, although we understand there may be multiple confounding aetiological factors. A large scale study with ultrasound examination of asymptomatic patients and biochemical analysis of retrieved gallstones is likely to provide more information.

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## The use of intercostal drainage following thoracoscopic lymph node biopsy

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**Keywords:** Thoracoscopy; lymph node biopsy; intercostal drain

### Abstract

### Introduction

Mediastinal lymph node biopsy is better done by thoracoscopy as the morbidity is found to be less than with thoracotomy. It provides a clear vision of the anatomy allowing a precise dissection and haemostasis. Following surgery, the collapsed lung can be expanded under direct vision. Hence elective use of intercostal drainage which is the normal practice following open surgery is open to discussion. Avoiding intercostal drainage reduces morbidity related to its use.

### Material and Methods

Patients subjected to thoracoscopic mediastinal lymph node biopsy were included in the study. Haemostasis was achieved during surgery with bipolar diathermy and ultrasonic dissector. The collapsed lung was expanded under direct vision. Intercostal drainage was not used in any of the patients and a post operative chest X ray was obtained to confirm lung expansion and detect complications. Heart rate, respiratory rate and blood pressure measurements were serially recorded to monitor for complications.

### Results

Eight patients were subjected to surgery; no haemothorax or pneumothorax was radiologically detected during the post operative period. The variations of cardiorespiratory parameters were within normal range in all patients during the post operative period. All patients were discharged within 48 hours.

### Conclusion

Elective use of intercostal drainage may not be required with thoracoscopic lymph node biopsy.

### Introduction

Mediastinal lymph nodes enlarge due to a variety of pathologies which include lymphoma, tuberculosis, secondary deposits and sarcoidosis. A histopathological diagnosis is essential for the management. Mediastinal lymph node biopsy is conventionally done with a lateral thoracotomy, which leads to significant morbidity including post operative pain and need for intensive or high dependency post operative care [1,2,3,4]. Ventilatory problems and chest infections caused by poor respiratory effort are recognized complications.[4] A thoracoscopic approach is found to be an attractive alternative due to lower morbidity [1,2,5]. Reduced pain due to the minimal access approach allows early mobilization and better respiratory effort. The incidence of chest infection, ventilatory complications and wound complications are reported to be less [5]. It is the usual practice to use intercostal drain tubes to prevent postoperative haemothorax or pneumothorax. The intercostal tube can lead to complications including injuries to intrathoracic structures on insertion, infection and damage to the lung parenchyma leading to a pneumothorax or haemothorax [6,7,8,9]. It also hinders mobilization and prolongs hospital stay. Demonstration of anatomy with magnification with the use of a thoracoscope allows for a precise dissection. Use of energy devices for tissue dissection ensures minimal blood loss. At the end of the procedure the collapsed lung can be expanded under direct vision. Evacuation of the pneumothorax and better haemostasis may permit the patients to be managed without an

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intercostal drain. The aim of this study was to evaluate the safety of managing patients who underwent thoracoscopic lymph node biopsy without the use of intercostal drainage.

## Method

All mediastinal lymph node biopsies were performed by thoracoscopic approach during the study period. The same anaesthetic and surgical teams were involved. Surgery was performed with general anaesthesia and endotracheal intubation using a single lumen tube. All patients were operated in the supine position. Three ports including two 10mm and one 5mm were used. A zero degree 10mm telescope was used. Partial lung collapse was obtained with a capnothorax of 6-8mmHg. Bipolar diathermy and ultrasonic dissectors were used for dissection. Lymph nodes were retrieved via the 10mm port. The lung was expanded under visual guidance of the camera. Intercostal drainage was not used. The patient's respiratory and haemodynamic parameters were monitored during pre-operative and post-operative periods and lung expansion was confirmed by a post operative chest x ray. Pain score and post-operative complications were documented.

## Results

Eight patients were operated during the period with no conversions to open surgery. Blood loss during the procedures was insignificant. The operating time ranged from 30 to 45 minutes. Following surgery, all patients were managed in the ward. Postoperative cardiovascular and respiratory parameters varied within the normal range in all patients (Figure 1, 2, 3). Chest X-

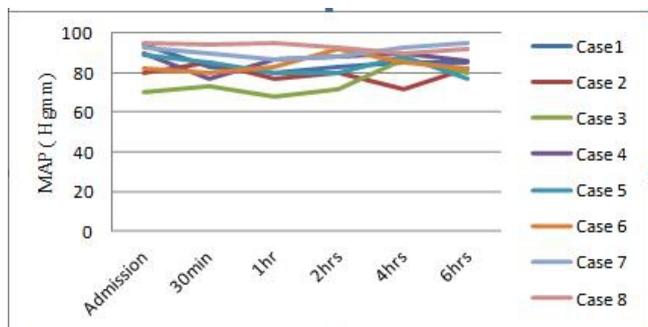


Figure 1. Post operative mean arterial blood pressure

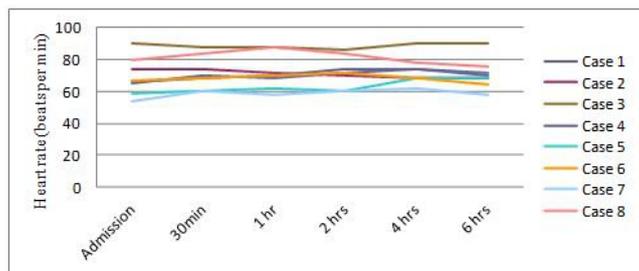


Figure 2. Post operative heart rate

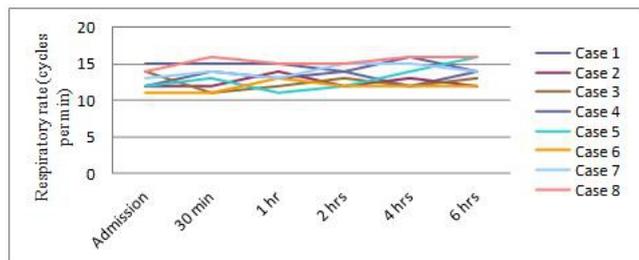


Figure 3. Post operative respiratory rate

rays taken post procedure confirmed full expansion of the lungs. The respiratory rate in all patients varied within 10 and 16 breaths per minutes which confirmed the absence of distress due to pain or a pneumothorax. None required insertion of an intercostal tube post operatively. All patients were discharged within 48 hours.

## Discussion

The advantages of thoracoscopy for mediastinal lymphnode dissection has been well established [10]. It has a high diagnostic sensitivity for mediastinal disease [11]. Single incision thoracoscopy is a further advancement of minimal access thoracic surgery, which has shown to improve outcome [12]. Watanabe et al. retrospectively compared 42 patients managed without a chest drain to 34 patients who received a chest drain during video assisted thoracoscopic lung biopsy [13]. Both groups satisfied criteria for early chest drain removal which were the absence of an air leak during the intraoperative sealing test, bullous or emphysematous changes in the lung, dense pleural adhesions and prolonged preoperative pleural effusion. Both groups (drain and no-drain) had non-significant differences in terms of uneventful recovery 32 (94%) vs. 38 (90%), (P=0.6858). In a later study Lucraz et al. randomized 60 patients to drain (n=30) versus no drain [14]. The median hospital stay was shown to be significantly

reduced in the group without a drain. All patients in that study were tested for intraoperative air leaks. The current study is a retrospective analysis involving a small number of patients. However it is the first of its kind in the local setting.

### Conclusion

The patients in this study were successfully managed without an intercostal tube. The risks and discomfort related to intercostal drains were thereby avoided. This finding provides evidence of another advantage of the thoroscopic approach to mediastinal lymph node biopsy although more high powered randomized trials are needed in this area.

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### Use of a rectus abdominis muscle cube to seal presacral venous haemorrhage

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**Key Words:** Presacral haemorrhage; rectus muscle; thumb tacks

Bleeding from presacral veins tends to be profuse and vigorous for several reasons. The inferior vena cava, the presacral veins, and the internal vertebral venous system, dilate under general anaesthesia and comprise a large venous “blood pool” in the pelvis. Inadvertent injury to these vessels may result in torrential venous haemorrhage because of lack of functional valves. In the Lloyd Davies and lithotomy positions pelvic venous hydrostatic pressure is generally higher than that in the inferior vena cava [1].

Presacral venous bleeding presents a formidable surgical challenge. Measures to control haemorrhage are mainly tamponade by packing and application of metallic thumbtacks [1]. Haemostatic clamps or sutures are usually ineffective and not advisable because these measures may result in further tearing of the vessel walls [2]. In extreme life threatening situations surgeons may be compelled to ligate the hypogastric arteries bilaterally or even clamp the abdominal aorta temporarily [1].

We present a rarely used method of electrocautery (80w, 230V) over a diced cube of rectus abdominis muscle graft which was placed over the bleeding vein.

A 53 year old lady underwent low anterior resection for rectal adenocarcinoma. She was placed in the modified Lloyd Davies position. During total mesorectal excision we encountered profuse presacral venous haemorrhage from a torn presacral vein. Estimated blood loss was one and half litres over ten minutes. Conventional methods of thumb tacks and prolonged presacral venous packing

failed to contain the haemorrhage [3]. We then resorted to use of rectus abdominis muscle graft; a one centimetre cube of rectus muscle was harvested and placed over the site of presacral venous haemorrhage. (Figure 1)

Monopolar diathermy was used to electrocoagulate the rectus muscle graft using the following settings; 80 watts - 230 volts in spray mode using an electrosurgical generator (Force FX, Valleylab City, USA). During coagulation we ensured that the surrounding area was packed off to prevent inadvertent spark induced small bowel injury. Formation of coagulum at the site of the venous tear instantly sealed off the bleeding. Diathermy coagulation over a rectus abdominis muscle graft is a simple, readily available and a reliable method in

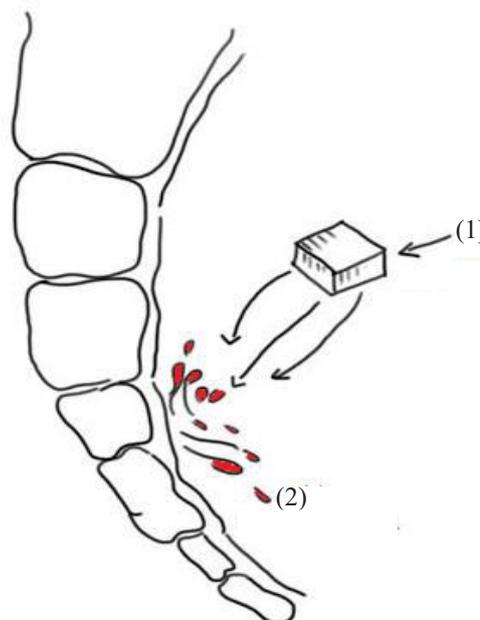


Figure 1. The rectus muscle cube (1) was placed over the bleeding point (2) and coagulated with the electrogenerator set to 80 watts

controlling presacral venous haemorrhage.

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### Announcement

The Sri Lanka Journal of Surgery is pleased to announce the election of Dr. Ajith Malalasekera as Editor-in-Chief of the journal from the year 2015. Dr. Malalasekera and his editorial team will make several changes to the face of the journal, some of which include restructuring of the Editorial Board and inclusion of International Editorial Advisors. The Editorial Board of the journal is committed to improvement of quality and we believe the changes that we make are part of the process of evolution that would help us achieve success in internationally acclaimed indexes of scientific journals.

Kemal I Deen  
Editor-in-Chief

### Aortocaval fistula due to ruptured abdominal aortic aneurysm

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**Key words:** Aortocaval fistula; abdominal aorta; aneurysm

#### Introduction

The rupture of an abdominal aortic aneurysm (AAA) is a devastating surgical condition associated with a very high morbidity and mortality. An aortocaval fistula (ACF) is an unusual, rare complication of ruptured AAA, involving less than 3–6% of all ruptured cases. The clinical manifestations are vague, depending on the degree of haemodynamic instability. A preoperative diagnosis can be made with thorough clinical assessment and timely imaging. This report tells us about the surgical treatment of a patient presented to the emergency department with an aortocaval fistula due to ruptured AAA. Furthermore, it will highlight the need for the high index of suspicion for early diagnosis and treatment of this often lethal condition.

#### Case report

A 70 year old male, hypertensive (poorly controlled) with chronic bronchitis and a heavy smoker presented with a sudden onset of central abdominal pain, backache and bilateral leg swelling for 2 days. The peripheries were warm and the pulse was well felt. Blood pressure was 110/80 mmHg and the pulse rate was 120 beats per minute. On general examination, the patient was dyspnoeic and not pale. Abdominal examinations revealed a pulsatile abdominal lump and thrill in the right hypochondrium; on auscultation there was a bruit.

An ultrasound abdomen revealed a large abdominal sacular aortic aneurysm extending in to the left common iliac artery, and a small amount of free fluid was found in the hepatorenal pouch that was suggestive of a rupture.

An urgent contrast enhanced computed tomography (CT) of the abdomen confirmed a leaking fusiform aneurysm of 9 cm in maximal diameter, with 4cm in the left common iliac artery and contrast in the inferior vena cava which suggested the presence of an aortocaval fistula (Figure 1 and 2).

A two dimensional echocardiogram revealed an ejection fraction of 60%, mild concentric left ventricular hypertrophy and grade 1 diastolic dysfunction with a conclusion of moderate cardiovascular risk to undergo general anaesthesia. A chest x-ray revealed features of



Figure 1. Coronal section of contrast enhanced computed tomography (CECT) showing an aortocaval fistula

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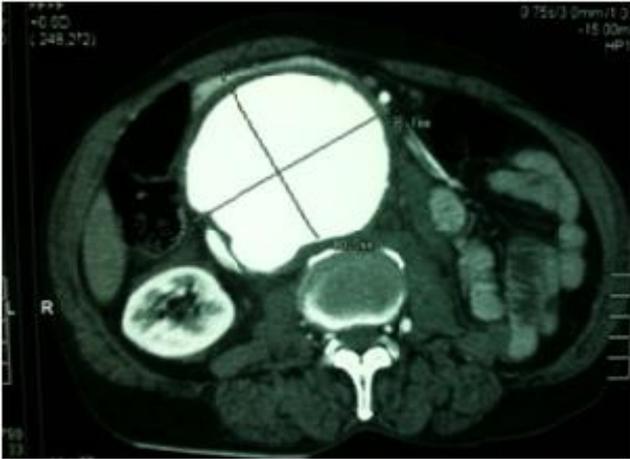


Figure 2. Cross section CECT scan of the abdomen showing the abdominal aortic aneurysm.

chronic obstructive pulmonary disease (COPD), his haemoglobin was 13.2 g/dL and serum creatinine was 120  $\mu$ mol/L.

An emergency abdominal aortic aneurysm repair was performed through a midline laparotomy incision. A ruptured infrarenal abdominal aortic aneurysm was noted retroperitoneally which communicated with the inferior vena cava (IVC).

The abdominal aortic aneurysm was carefully opened and IVC bleeding was halted with digital control. The AAA was repaired with a 16x8mm bifurcated Dacron graft and the defect in the IVC also repaired. The aortic cross clamp time was 1 hour and 15 minutes.

The patient was managed in intensive care initially and the high dependency units, in the first 3 post-operative days, and subsequently in the vascular ward. He developed an exacerbation of his COPD with lower respiratory tract infection on post-operative day 2. Eventually he recovered by the 10th post-operative day and was discharged. He was commenced on lifelong antiplatelet and statin therapy in addition to his antihypertensive medication. Furthermore, his lifestyle modifications including cessation of smoking were addressed.

## Discussion

The rupture of an AAA into the inferior vena cava is a relatively rare event (<3%). The majority (>80%) of

aortocaval fistulas are due to spontaneous rupture of aortic aneurysms. Penetrating trauma (war injuries), Takayasu's arteritis, mycotic aneurysms and connective tissue diseases are other causes [1]. It was first reported by Syme in 1831 [2] and the first successful repair was done by Cooley et al. in 1954 [3]. Without intervention, death will result in less than 2 months, in the natural progress of events [4].

Depending on the degree of confinement of blood following rupture, haemodynamic instability will vary, resulting in a spectrum of clinical presentations from an asymptomatic state to a collapsed state. Predominant challenges faced by the surgeon during operation include control of back bleeding by the IVC, prevention of thrombus migrating into the IVC and paradoxical thromboembolism. A preoperative diagnosis will help to plan the operation in order to minimize blood loss and avoid possible intraoperative pulmonary embolism [5,6].

Unusual clinical features of ruptured AAA include sudden onset of abdominal pain followed by shortness of breath, bilateral leg oedema, an audible machinery-like bruit and / or a thrill in the abdomen [7-8]. The abrupt rise of IVC flow by an aortocaval fistula leads to a rise in right atrial pressure and right heart failure. This is why these patients develop tachycardia, elevated jugular venous pressure and bilateral leg swelling.

An ultrasound scan will show the possible rupture but is inaccurate for detecting the fistula as in this case. Contrast enhanced CT of the abdomen forms the cornerstone of the diagnosis. Classic findings include indentation and fistula line in the vena cava, disappearance of the fatty planes between the vena cava and aorta, and rapid simultaneous contrast passage into the vena cava from the aorta [9].

Timely corrective emergency surgery has to be performed. Outcome determinants are the patient's comorbid status, degree of haemodynamic instability as well as rapidity of operative correction. During operation, a standard midline laparotomy is performed and transperitoneal aortic inflow and outflow control is first required. The aortic sac is opened and the fistulous opening into the IVC is controlled with digital or

balloon occlusion before repair. At this point, there is a possible risk of dislodging a clot into the IVC and embolism. In extreme situations, there are case reports of IVC ligation without significant ill effects.

A minimal invasive technique of managing AAA and fistula is by endovascular stenting with reduced morbidity and mortality compared with open operation. It is likely the way forward in modern vascular surgery. An “endoleak” ( type 11) is a problem associated with graft malfunction [10-14].

If an AAA ruptures into the inferior vena cava, the clinical manifestations will vary depending on concomitant blood loss into extravascular compartments. If there is minimal apparent blood loss, the patient will present with symptoms of right heart failure instead of cardiovascular collapse. What is unusual, however, is the presence of a thrill and bruit in the right hypochondrium, in addition to a pulsatile lump in the epigastrium. Timely intervention will reduce morbidity and mortality. Endovascular stenting is the way forward minimizing morbidity and resulting in a short hospital stay.

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**Key points:**

- ☞ Rupture of an abdominal aortic aneurysm into the inferior vena cava may be suspected if a pulsatile abdominal mass is present in association with features of right heart failure and / or a right hypochondrial thrill or bruit.
- ☞ Contrast enhanced computerised tomography is the investigation of choice.
- ☞ Paradoxical embolism is a complication.
- ☞ Endovascular stenting is emerging as the treatment of choice.

# Perforation of Meckel diverticulum presenting with acute appendicitis

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**Key Words:** Perforation of Meckel diverticulum; vegetable stalk; acute appendicitis

### Introduction

Meckel diverticulum is the most common congenital structural abnormality of the gastrointestinal tract. In 1809, Johann Friedrich Meckel first described its embryological origin. Between 2% and 4% of people may have Meckel diverticulum and 4-6% of them suffer from complications [1]. Meckel diverticulitis is usually confused with acute appendicitis and perforation with peptic ulcer perforation. We report a case which was clinically diagnosed as acute appendicitis which turned out to be perforation of a Meckel diverticulum, with inflammation of the appendix. This diagnostic and therapeutic dilemma of the case gives us an opportunity to report it as a case of interest.

### Case report

A 15 year old boy was admitted to hospital presenting with pain in the right lower abdomen for five days, abdominal distension, fever and vomiting. He looked ill and dehydrated. His pulse was 120 beats per minute, blood pressure was 90/70 mmHg and temperature was 39.40°C. There was tenderness and muscle guarding in the right lower abdomen and the hypogastrium. Liver dullness was not obliterated and bowel sounds were absent. The rectovesical pouch was tender while other systems were normal. A plane x-ray of the abdomen showed air filled distended bowel loops, there was no sub-diaphragmatic free gas. A complete blood count showed neutrophilic leucocytosis, 4-8 pus cells and 1-2 red cells per high power field on light microscopy. A trans-abdominal ultrasound scan revealed a grossly

swollen vermiform appendix and a pelvic collection of fluid. A diagnosis of acute appendicitis with a pelvic collection was made.

A laparotomy was performed by grid iron incision in the right lower quadrant of the abdomen which required extension both downward and medially. The vermiform appendix was grossly swollen and pelvic in position. During manipulation of the appendix in the pelvis, about 100 ml of pus along with hard vegetable stalks were extruded. An appendectomy was performed; there was no perforation (Figure 1a, 1b).

Concurrently, we examined the ileum, and at approximately 65 cm from the ileocaecal junction, a perforated Meckel diverticulum was detected which was excised with a 2cm ante-mesenteric rim of ileum (Figure 2a, 2b).

After irrigation and suction of pus from the pelvic abscess cavity, the abdomen was closed. Recovery was uneventful and at follow-up appointments at one, two and four months, the patient continued to remain healthy.

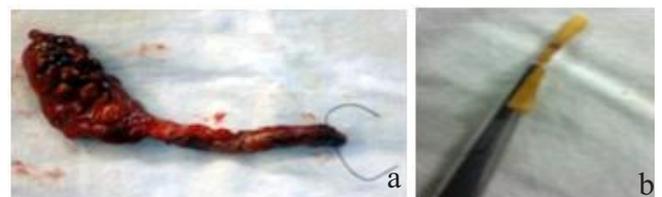


Figure 1a, 1b. Inflamed appendix and vegetable stalk

Histopathology of the vermiform appendix revealed microscopic features of acute appendicitis and Meckel diverticulitis with perforation and a mucosal lining of small intestinal type. Microbiological analysis of the pelvic pus showed *Escherichia coli spp*, *Klebsiella* and

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Figure 2a, 2b. Perforated Meckel diverticulum

*Streptococcus pyogenes* which were found to be sensitive to metronidazole, ciprofloxacin and amikacin.

### Discussion

Meckel diverticulum occurs in about 2% of the population and it is twice as much common in males than in females [1, 2]. Bleeding, diverticulitis, obstruction, intussusception and perforation are complications. Perforation constitutes about 0.5% of all complications of which 10% results from diverticulitis. It may also occur due to ulcers and foreign bodies such as fish and chicken bones, lithiasis and vegetable stalks [3, 4]. Perforation caused by the latter is very rare. Perforation is usually confused with peptic ulcer perforation and rarely with acute appendicitis [5]. We made an initial diagnosis of acute appendicitis and considered a laparoscopic procedure hazardous because

of the possibility of adhesions. Instead, a laparotomy was undertaken, where the vermiform appendix was swollen and pelvic in position. During its manipulation and the suction of pelvic pus, hard vegetable stalks were found within pus. Assuming perforation of gut, we examined the ileum and detected perforated a Meckel diverticulum. At the time, it was difficult to determine whether this was a case of both acute appendicitis and perforation of Meckel diverticulum.

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### Key points:

- ☞ Perforation of Meckel diverticulum may present as acute appendicitis and vice-versa.
- ☞ In all cases of acute appendicitis the ileum should be checked for additional pathology.

# Subcutaneous phaeohyphomycosis of the scalp - a rare fungal infection treated by excision

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**Key words:** Subcutaneous phaeohyphomycosis; dematiaceous molds; scalp subcutaneous phaeohyphomycosis

### Introduction

Fungal infections are known to occur in immune-compromised individuals. Most are treated by antifungal chemotherapeutic agents either by local measures or by systemic treatment. Phaeohyphomycosis, derived from the Greek language meaning dark fungi with hyphae, is a rare condition. We describe what we believe is the first ever case report of phaeohyphomycosis in the occipital region of the scalp which mimicked a dermoid cyst.

### Case report

A 23 year old male presented with a 3 year history of a painless scalp swelling in the occipital region. He had had a history of trivial head trauma. He did not suffer from medical illnesses and had no previous surgical procedures. The swelling was 3 cm in diameter and situated over the midline of the occipital region, just above the occipital protuberance. It was soft, cystic in consistency and had a smooth surface. The lump was in the subcutaneous plane, mobile and was not transilluminant. There was no cough impulse or bony indentation. The provisional diagnosis was dermoid cyst of the scalp. Fine needle aspiration cytology assessment was undertaken and reported as an epidermoid cyst. A computed tomography image of the skull was taken which revealed a hypodense soft tissue swelling over the occipital region of the scalp, probably dermoid cyst (Figure 1). Under local anesthesia, the swelling was excised completely and sent for

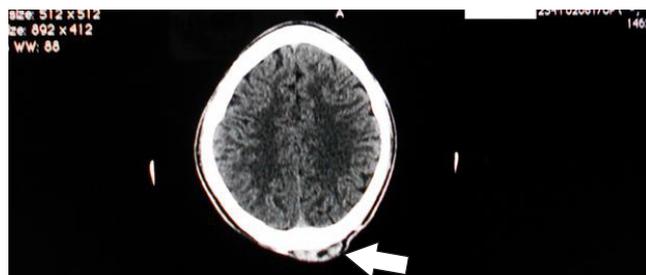


Figure 1. Computerised tomogram of the brain showing a hypodense lesion in the subcutaneous plane of the occipital region (arrow) - this is subcutaneous phaeohyphomycosis mimicking a dermoid cyst

histopathological examination.

The histopathological examination report was a fibrocollagenous tissue with clusters of pigmented fungal hyphae infiltrating into the fibrocollagenous tissue, suggestive of a subcutaneous phaeohyphomycosis (Figure 2). We were not able to find the causative species as the specimen was fixed in formalin after excision.

### Discussion

In 1983, McGinnis introduced the concept of phaeohyphomycosis [1]. “Phaeo” is a Greek word which means “dark” and “hypho” stands for “fungi with hyphae” [2]. Phaeohyphomycosis is a fungal infection caused by dematiaceous fungi or melanised fungi, since group of fungi has melanin in their cell wall. *Wangiella dermatitidis*, *alternaria*, *curvularia*, *cladophialophora* and *expholia jeanselmei* are the common species causing phaeohyphomycosis.

Phaeohyphomycosis is a rare disease. In 2002, Sharma et al. reported 23 cases of subcutaneous phaeohyphomycosis in India [3]. In Malawi, O Donnell PJ et al. reported nine cases of subcutaneous phaeohyphomycosis in extremities [4]. In Brazil,

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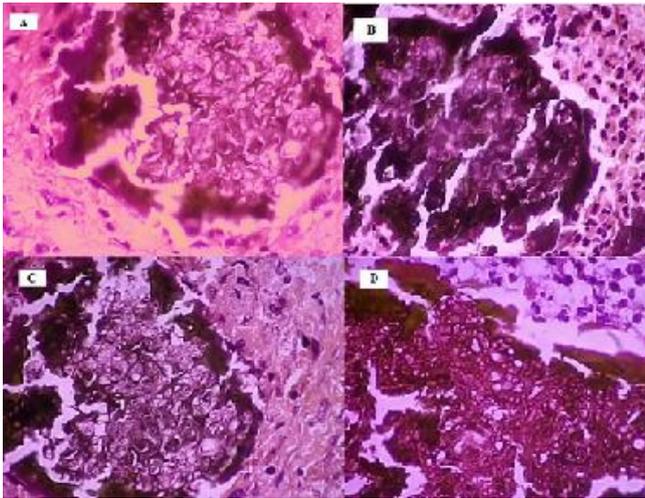


Figure 2. Subcutaneous phaeohyphomycosis - dematiaceous mold under low power light microscopy (A). B,C,D are high power light microscope images of the characteristic brown pigmented hyphae (B) and neutrophils (C) . D shows fungus stained with per-iodic acid Schiff diastase stain.

Cecília Bittencourt Severo et al. reported 18 cases of subcutaneous phaeohyphomycosis in which most of the cases were in transplant patients in the extremities and in the vital organs such as the lungs and brain [5]. Subcutaneous phaeohyphomycosis is more common in the extremities, buttocks and rarely the scalp. A pubmed search for case reports on subcutaneous phaeohyphomycosis of extremities provided 39 search results, while there were no results for subcutaneous phaeohyphomycosis of the scalp as of up to July 2014.

So this is the first case report of subcutaneous phaeohyphomycosis of the scalp in a 23 year old male.

The clinical presentation of subcutaneous phaeohyphomycosis is a painless swelling, which is cystic to firm in consistency in the subcutaneous plane and is common in immunocompromised patients. Usually the diagnosis is made after excision with the histopathological examination as in this case. Treatment is by surgical excision. Itraconazole in the post-operative period has shown promising results in the treatment of subcutaneous phaeohyphomycosis both in immuno-compromised and normal patients

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### Key Points:

- ☞ Phaeohyphomycosis is a rare fungal infection which presents as a painless swelling
- ☞ This condition occurs commonly in individuals who are immunocompromised.
- ☞ Dermoid cyst is a differential diagnosis.
- ☞ Treatment is by surgical excision and treatment with itraconazole.

### Penile incarceration with metallic objects: two cases with review of literature

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**Key words:** Penis; gangrene; erectile dysfunction

#### Introduction

Incarceration of the penis by foreign bodies has been reported sporadically [1]. The application of these devices is generally intentional while being rarely accidental and usually done for enhancement of sexual response [2, 3], self treatment of erectile dysfunction [4, 5] or secondary to psychiatric disturbances [6]. The largest series was published by Dakin from U.S.A in 1755 [1]. Men, mostly between the ages of 15–55 years, were involved in these perverted acts [1]. The patient may present simply with either oedema of the penile skin or gangrene of the penis depending on the time lapse. Early intervention therefore, is key to successful management with minimal or no morbidity.

We report two cases of patients with sex anxiety, who presented with incarceration of the penis by metallic objects.

#### Case reports

##### Case 1

A 30 year old male presented with an incarcerated penis (Figure 1). He had attempted masturbation through a metallic bolt eighteen hours ago and had been doing so for years besides leaving the bolt attached to the penile shaft. He said he kept it attached a little longer on the occasion of his presentation until he could no longer remove it manually. There was gross swelling, congestion and blistering of the distal penile shaft (Figure 2). He was in severe pain due to urinary retention and the bladder was palpable up to the umbilicus. The patient was married and divorced.



Figure 1a,1b. 1a - Case 1 with penile incarceration secondary to a heavy metallic bolt. Note the distal penile edema, severe congestion and skin changes. 1b - After removal of the metallic bolt.

##### Case 2

The second patient was a 31 year old unmarried, homosexual male who also presented in the emergency room with complaints of a strangulated penis. He said he and his partner were in the habit of strangulating their respective penises with a metallic wire with progressive tightening of the wire (Figure 2a). They acquired this habit after watching pornographic movie clips. Previously he had had no difficulty in removing the wires but this time, he had been unable to remove it leaving the wire in place for the past 3 days. There was gross distal penile oedema with deep ulceration below the wire (Figure 2b). He had not passed urine for six hours despite having an urge to micturate.

Both the patients were injected with diclofenec sodium and tramadol for analgesia and antibiotics were given as per hospital policy. In the operating theatre urinary catheterization was unsuccessful in both. 2% Xylocaine jelly was applied for lubrication and multiple needle punctures were undertaken to release the interstitial fluid.

Further treatment of case 1 included the placement of a

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Figure 2a,2b. 2a-Case 2 with penile incarceration secondary to a constricting tight metal wire with gross edema of penile shaft. 2b- Metallic wire at the root of penis

hot mop over the penis, to lessen the oedema for 30 minutes, with intermittent cessation. Later the metal bolt was pushed distally and removed with the aid of xylocaine jelly lubrication. He passed urine soon after. His skin ulceration healed without further urethral complications.

In case 2, the patient was sedated with midazolam and the wire was cut using a metallic wire cutter. The patient passed urine with no apparent urethral fistulisation. There was a deep seated ulcer over the penile shaft which healed with use of daily dressings in six weeks. At one year follow up, he continued to remain well.

Both men were later referred to a psychiatrist who diagnosed a sexual anxiety disorder for which treatment was commenced.

### Discussion

Incarceration of the penis is rare. The patient presents with signs and symptoms depending on the duration of entrapment of the penis. Initially the venous and lymph drainage is obstructed, but the arterial flow continues, leading to progressive oedema of the penile skin. Later the arterial flow is also compromised resulting in various complications such as urinary retention, urethral stricture, urethral fistula, skin gangrene, desquamation of the skin, formation of bullae, priapism, reduced skin sensation, gangrene of the penile

epidermis and subcutaneous tissue, and tissue incision by metal objects [7,8,9,10]. Early intervention is therefore the key to successful treatment. Depending on the condition of the penis at the time of presentation, Bhat et al. have classified the penile incarceration into five grades (Table 1) [7]

Several innovative techniques have been devised and proposed by various authors which are broadly divided into four groups: [11]

- a) The string technique and its variants, with and without aspiration of blood from the glans penis.
- b) Aspiration techniques
- c) Cutting devices
- d) Surgical intervention

The treatment techniques applied depend on the grade of trauma. The string and aspiration techniques have been applied for grades 1-3 injury and surgery is generally reserved for grade 4-5 injuries.

The string technique (string cord, umbilical tape) was first described by Flatt [12] for removing the constricting ring from the finger. Later Detweiler and Perkins [11] used latex in a similar way and described it as the wrapping technique. Yet others like Kumar and Gupta [13] used tape gauze for the same purpose, including application of intravenous drip tubing circumferentially from the tip of the penis to its base. The basic principle behind this technique is to provide equal and sustained compression over the whole length of the penis to reduce skin oedema. In the aspiration technique some of the blood is aspirated from the glans and shaft of the penis to achieve detumescence.

The task becomes more challenging when the aforementioned techniques fail. The object is then cut apart depending on the availability of the cutting device such as a saw, cutting tong, high speed drill, hammer, chisel or a Dremel Moto tool etc [5,7,14]. The use of a drill for cutting the object generates much heat which can be injurious to the penis and hence copious amounts of ice water should be used for irrigation [5, 14].

Surgery includes degloving up to Buck's fascia or

Grade 1	Distal oedema only
Grade 2	Distal oedema, skin and urethral trauma, corpus spongiosum compression, decreased penile sensation
Grade 3	Skin and urethral trauma, no distal sensation
Grade 4	Separation of corpus spongiosum, urethral fistula, corpus cavernosum compression, no distal sensation
Grade 5	Gangrene, necrosis, or distal penile amputation

corpus cavernosa to reduce the effective diameter of the penis, debridement of the devitalised tissue followed by skin grafting [7,9,15]. In some cases with grade 4 and 5 injuries, penile amputation and microsurgical re-implantation has also been proposed [8,9]. Urethrocutaneous fistula and urethral stricture may require reconstruction.

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**Key points:**

- ☛ Impacted constricting devices around the penis used for sexual gratification require urgent treatment to prevent penile gangrene.
- ☛ A combination of needle puncture, graduated compression of the penile shaft and removing the constricting object restore penile blood flow.
- ☛ There is usually an underlying mental disorder which requires specialist attention.

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Editor - Rohan Siriwardena

### **Impact of routine intraoperative cholangiography during laparoscopic cholecystectomy on bile duct injury**

Alvarez FA et. al. Br J Surg. 2014; 101(6): 677-84.

#### **Background**

The role of intraoperative cholangiography (IOC) in the diagnosis, prevention and management of bile duct injury (BDI) remains controversial. The aim of the present study was to determine the value of routine IOC in the diagnosis and management of BDI sustained during laparoscopic cholecystectomy (LC) at a high-volume centre.

#### **Methods**

A retrospective analysis of a single institution database was performed. Patients who underwent a laparoscopic cholecystectomy with a routine IOC between October 1991 and May 2012 were included.

#### **Results**

Among 11,423 consecutive LCs, IOC was performed successfully in 95.7% of patients. No patient had an IOC related complication. Twenty patients (0.17%) sustained a bile duct injury during a laparoscopic cholecystectomy, and the diagnosis was made during surgery in 18 patients. Most bile duct injuries were type D according to the Strasberg classification. The sensitivity of intraoperative cholangiography for the detection of bile duct injury was 79%; specificity was 100%. All injuries diagnosed during surgery were repaired during the same surgical procedure. Two patients developed early biliary strictures that were treated by percutaneous dilatation, and a Roux-en-Y hepaticojejunostomy with satisfactory long-term results.

#### **Conclusions**

The routine use of intraoperative cholangiography

during a laparoscopic cholecystectomy in a high-volume teaching centre, was associated with a low

incidence of bile duct injury, and facilitated detection and repair during the same surgical procedure with a good outcome.

#### **Commentary**

Anura Banagala  
Consultant Surgeon  
National Hospital of Sri Lanka

Place of routine cholangiography during laparoscopic or open cholecystectomy remains controversial. The study of the impact of a routine intraoperative cholangiogram (IOC) on prevention of bile duct injury, (BDI) was neither an aim of this study nor feasible in the absence of a control arm. The low incidence of bile duct injury reported could be due to the observation of the critical view of safety (CVS) and mature team experience during the long period of the study from October 1992 to May 2012. The temporal distribution of BDI during this period has not been analyzed particularly before and after the introduction of CVS.

Nevertheless, the value of a routine IOC in the early diagnosis of BDI is clear, leading to early definitive management, and reducing the complications and high cost associated with late diagnosis. Some late leaks, presumably due to electrocautery, would not have been detected by the IOC, and probably explains the four leaks missed. Some cystic duct leaks observed in this study may have resulted directly due to IOC technique, though in retrospect there is no way of proving this, and they were unaccounted for as the cystic duct leaks were excluded.

The patients who were converted to open cholecystectomy were excluded from the study, perhaps resulting in a lower perceived incidence of BDI, as these cases were more likely to have been technically difficult, and presumably associated with a higher

incidence of BDI.

The authors presented a good description, classification and aetiological analysis of the bile duct injuries observed in this study, which is all pertinent in the primary definitive management of BDI and deserves praise.

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**The NOTA Study (Non Operative Treatment for Acute Appendicitis): prospective study on the efficacy and safety of antibiotics (amoxicillin and clavulanic acid) for treating patients with right lower quadrant abdominal pain and long-term follow-up of conservatively treated suspected appendicitis.**

Di Saverio S et al. *Ann Surg.* 2014; 260(1): 109-17.

**Objective**

To assess the safety and efficacy of antibiotic treatment for suspected acute uncomplicated appendicitis and to monitor the long term follow-up of non-operated patients.

**Background**

Right lower quadrant abdominal pain is a common cause of emergency department admission. The natural history of acute appendicitis treated non-operatively with antibiotics remains unclear.

**Methods**

In 2010, a total of 159 patients [mean AIR (Appendicitis Inflammatory Response) score = 4.9 and mean Alvarado score = 5.2] with suspected appendicitis were enrolled and underwent non-operative management (NOM) with amoxicillin/clavulanate. The follow-up period was 2 years.

**Results**

Short-term (7 days) NOM failure rate was 11.9%. All patients with initial failures were operated within 7 days. At 15 days, no recurrences were recorded. After 2 years, the overall recurrence rate was 13.8% (22/159); 14 of 22 patients were successfully treated with further cycle of amoxicillin/clavulanate. No major side effects

occurred. Abdominal pain assessed by the Numeric Rating Scale and the visual analog scale; median Numeric Rating Scale score was 3 at 5 days and 2 after 7 days. Mean length of stay of patients managed non-operatively was 0.4 days, and mean sick leave period was 5.8 days. Long-term efficacy of NOM treatment was 83% (118 patients recurrence free and 14 patients with recurrence managed non-operatively). None of the single factors forming the Alvarado or AIR score were independent predictors of failure of NOM or long-term recurrence. Alvarado and AIR scores were the only independent predictive factors of NOM failure after multivariate analysis, but both did not correlate with recurrences. Overall costs of NOM and antibiotics were &OV0556;316.20 per patient.

**Conclusions**

Antibiotics for suspected acute appendicitis are safe and effective and may avoid unnecessary appendectomy, reducing operation rate, surgical risks, and overall costs. After 2 years of follow-up, recurrences of non-operatively treated right lower quadrant abdominal pain are less than 14% and may be safely and effectively treated with further antibiotics.

**Commentary**

Nilhan Nugaduwa  
Consultant Surgeon  
Base Hospital Wathupitiwala

Early appendicectomy has, for long, been the "gold standard" of managing appendicitis. This has been challenged recently by the publication of a series of studies by Pisano [1], Hansson [2], Varadhan [3], Eriksson [4] and others advocating the use of antibiotics as safe and efficient management, avoiding unnecessary surgery.

The present NOTA study by Di Saverio et al, is a prospective, observational study of a small population (159), which revealed a 14% 2 year failure rate with antibiotic therapy. These patients underwent appendicectomy and 22% of them had significant intraperitoneal sepsis. Some authors (Andersson 2007 [5]), consider uncomplicated and complicated appendicitis with perforation/ abscess formation as

different entities, that require different management strategies. Thus, an accurate, institutional, diagnostic–therapeutic score/ algorithm, with possible enhanced imaging and inflammatory marker modalities is needed for proper diagnosis and patient selection.

From a Sri Lankan context, the problems of adopting a NOTA approach would be proper patient selection and follow up to detect recurrences. The local conservative practice is usually the use of intravenous antibiotics for delayed presentation of appendicitis and appendicular mass formation. It is noteworthy that several studies indicate that routine use of interval appendectomy is not justified in asymptomatic patients.

Several large, multicentric RCT's are currently underway, with plans for long periods of follow up. This would hopefully settle the debate on the management of appendicitis, with resultant amendment of accepted guidelines. It is only then that a safe surgeon should change practice.

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#### **The impact of routine open non-suction drainage on fluid accumulation after thyroid surgery: a prospective randomized clinical trial**

Neary PM et. al. *World J Surg Oncol* 2012;10:72.

#### **Background**

Thyroid drains following thyroid surgery are routinely used despite minimal supportive evidence. Our aim in this study is to determine the impact of routine open drainage of the thyroid bed postoperatively on ultrasound-determined fluid accumulation at 24 hours.

#### **Methods**

We conducted a prospective randomised clinical trial on patients undergoing thyroid surgery. Patients were randomly assigned to a drain group (n=49) or a no-drain group (n=44) immediately prior to wound closure. Patients underwent a neck ultrasound on day 1 and day 2 postoperatively. After surgery, we evaluated visual analogue scale pain scores, postoperative analgesic requirements, self-reported scar satisfaction at 6 weeks and complications.

#### **Results**

There was significantly less mean fluid accumulated in the drain group on both day 1, 16.4 versus 25.1 ml (P-value = 0.005), and day 2, 18.4 versus 25.7 ml (P-value = 0.026), following surgery. We found no significant differences between the groups with regard to length of stay, scar satisfaction, visual analogue scale pain score and analgesic requirements. There were four versus one wound infections in the drain versus no-drain groups. This finding was not statistically significant (P = 0.154). No life-threatening bleeds occurred in either group.

#### **Conclusions**

Fluid accumulation after thyroid surgery was significantly lessened by drainage. However, this study did not show any clinical benefit associated with this finding in the non-emergent setting. Drains themselves showed a trend indicating that they may augment infection rates. The results of this study suggest that the frequency of acute life-threatening bleeds remains extremely low following abandoning drains. We advocate abandoning routine use of thyroid drains.

## Commentary

E.A.D. Udayakumara  
Consultant Surgeon  
Teaching Hospital Kurunegala

The concept of drain or no drain is a matter of controversy in our practice. A majority of patients in the aforementioned study includes those with a small goitre who did not undergo total thyroidectomy.

By contrast, the majority of our patients have grade III to IV benign multinodular goitres with a retrosternal or retrotracheal component, where dead space and soft tissue handling is more.

Since the neck is a compact area, an appropriately placed and functioning drain is a safe option

in these patients, in a setting where monitoring and observation is not optimum. Accordingly our experience determines that we could safely refrain from use of drains in those patients who undergo small goitre thyroidectomy and lobectomy. There is a famous dictum “when in doubt, drain” which is now a controversial issue. Such a decision is likely going to be based on individual surgeon's preference.

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### **A systematic review of the effects of resident duty hour restrictions in surgery: impact on resident wellness, training, and patient outcomes.**

Ahmed N et. al. *Ann Surg* 2014; 259(6): 1041-53.

#### **Background**

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) mandated 80-hour resident duty limits. In 2011 the ACGME mandated 16-hour duty maximums for PGY1 (post graduate year) residents. The stated goals were to improve patient safety, resident well-being, and education. A systematic review and meta-analysis were performed to evaluate the impact of resident duty hours (RDH) on clinical and educational outcomes in surgery.

## Methods

A systematic review (1980-2013) was executed on CINAHL, Cochrane Database, Embase, Medline, and Scopus. Quality of articles was assessed using the GRADE guidelines. Sixteen-hour shifts and night float systems were analyzed separately. Articles that examined mortality data were combined in a random-effects meta-analysis to evaluate the impact of RDH on patient mortality.

## Results

A total of 135 articles met the inclusion criteria. Among these, 42% (N = 57) were considered moderate-high quality. There was no overall improvement in patient outcomes as a result of RDH; however, some studies suggest increased complication rates in high-acuity patients. There was no improvement in education related to RDH restrictions, and performance on certification examinations has declined in some specialties. Survey studies revealed a perception of worsened education and patient safety. There were improvements in resident wellness after the 80-hour workweek, but there was little improvement or negative effects on wellness after 16-hour duty maximums were implemented.

## Conclusions

Recent RDH changes are not consistently associated with improvements in resident well-being, and have negative impacts on patient outcomes and performance on certification examinations. Greater flexibility to accommodate resident training needs is required. Further erosion of training time should be considered with great caution.

## Commentary

Duminda Gunawardana  
Consultant Surgeon  
District General Hospital, Nuwara Eliya

Recently a Sri Lankan hospital conducted an in-house inquiry over a death, during a long distant transfer at late night, where the resident was alleged to fall asleep. Though not reported in literature this is not the only incidence of this nature.

Resident duty hours (RDH) are still evolving as the debate continues of how best to balance the patient safety, resident wellbeing and education. United states, Canada, Europe (primarily the UK), New Zealand and Australia are some of the countries with established restrictions to duty hours. They have diverse approaches accommodating the needs of different health care systems, cultural diversities and education programs. Some have implemented regulations and some uses the restrictions as guidelines only. However in Sri Lanka there are no RDH restrictions for surgical trainees.

Despite the considerable number of studies, it remains unclear whether these limitations impact patient care and other expected outcomes. This systemic review has analysed 135 articles to evaluate the impact of RDH restrictions on resident well-being, education, and/or patient safety. Majority of the articles has shown that the restrictions have a negative impact on patient outcomes. An improvement of resident well-being and a worsening or unchanged resident education was also shown. However only one study has used the randomised controlled trial model. Mostly, comparison has been made in different time frames and there is a considerable heterogeneity of the study articles.

It's evident that the problem of RDH is not addressed adequately. Also there is a gap between the expectations and the outcomes of implementations made. Flexibility in duty hour restrictions for surgical trainees ("FIRST") trial is a randomised trial planned to conduct from 2014 to 2016 by American Board of Surgery and the American College of Surgeons to gain high quality evidence upon which to base future RDH requirement decisions in USA. Sri Lanka can learn from the experience of these countries and use the available evidence to develop a model fit for the needs and expectations of the country.

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### **The comparison of self-gripping mesh and sutured mesh in open inguinal hernia repair: the results of meta-analysis.**

Li J et. al. Ann Surg 2014; 259(6): 1080-5

### **Objective**

The aim of this study was to compare the postoperative chronic pain and other postoperative complications after the use of the self-gripping Progrid meshes and the application of conventional suture-fixed Lichtenstein procedure.

### **Background**

Chronic pain after inguinal hernia repair is a complex problem. Many efforts have been put to reduce the postoperative chronic pain after open inguinal hernia repair, and the results are conflicting.

### **Methods**

A systematic literature review was undertaken to identify studies comparing the outcomes of open inguinal hernia repair with self-gripping Progrid meshes and the conventional Lichtenstein technique.

### **Results**

The present meta-analysis pooled the effects of outcomes of total 1353 patients enrolled into 5 randomized controlled trials and 2 prospective comparative studies. Statistically, there was no difference in the incidence of chronic pain [odds ratio = 0.74, 95% confidence interval (CI) (0.51-1.08)]. And there was no statistical difference in the incidence of acute postoperative pain [odds ratio = 1.32, 95% CI (0.68-2.55)], hematoma or seroma [odds ratio = 0.89, 95% CI (0.56-1.41)], wound infection [risk difference = -0.01, 95% CI (-0.02 to 0.01)], and recurrence [risk difference = 0.00, 95% CI (-0.01 to 0.01)]. The self-gripping mesh group was associated with a shorter operating time (1-9 minutes).

### **Conclusions**

When the self-gripping mesh compared with the conventional suture fixed Lichtenstein technique, while there was a difference in operative time, there were no differences in pain (chronic or acute) or other complications.

## **Commentary**

Lalantha Ranasinghe  
Consultant General Surgeon  
National Hospital of Sri Lanka Colombo

Undoubtedly every surgeon has come across this complication embarrassing him as well as the patient equally. What has not come to light in this analysis is a clear solution to this problem.

Authors while admitting chronic pain as a complication have failed to clearly isolate a causative factor/s. In my opinion, trying to find a remedy without identifying the root cause will very likely end in a futile exercise.

Analysis seems to be rational and scientific. Drawbacks and limitations too have been well addressed. The conclusions drawn subsequent to that appears logical.

Self-gripping mesh as expected is quite expensive rendering no clear gain over the conventional mesh with regard to chronic post-operative pain. It would not be anything but rational for one to choose the less expensive mesh in the absence of any clear clinical advantage. In a country like ours (Sri Lanka) we are, more than in developed countries, compelled to address the cost factor. In other words the cost factor may override even a slight clinical advantage.

### Correspondence – Beyond evidence-based medicine

R. Fernando

Faculty of Medicine, University of Kelaniya and North Colombo Teaching Hospital, Ragama, Sri Lanka

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I read with interest the letter written by Dr. A.M Abeygunasekera on the above topic. I must thank him for initiating a debate on a topic of importance and raising some relevant issues.

I agree wholeheartedly that evidence based medicine poses very difficult challenges in a resource limited health care system like in Sri Lanka, and that evidence based medicine is not a perfect tool. However it is the best tool we have currently and it is up to the doctors to use it judiciously and explicitly as advocated by David Sackett and Gordon Guyatt. [1]

I do not agree with the basic tenet that evidence based medicine is a tool to provide 'perfect' health care for a few privileged patients or that it is a tool to give scientific validity to the industry to sell their expensive tools.

On the contrary it is evidence based medicine that has enabled us to select the best possible care for patients while in a resource limited environment. It is evidence based medicine that tells us that an inexpensive treatment is as effective as an expensive alternative.

We as doctors have a greater responsibility to assess the evidence carefully to make decisions based on science. It should eliminate the use of treatment methods which are 'opinion based' and subject to idiosyncrasies of individual consultants, which may lead to exploitation of patients. Adherence to evidence based medicine forestalls such practices.

In the modern era of information technology, patients have access to all the evidence and they sometimes question the doctor on the evidence for a method of treatment. Is it a fact that some doctors ignore the evidence and depend on personal opinions which leads to abuse?

Regarding the exploitation by industry, it is true that companies tend to push products aggressively, but it is evidence based medicine that has prevented 'on mass' use of various devices which will not benefit the patient. One clear example is the use of a robot in thyroidectomy. It was promoted as the 'in thing' in endocrine surgery, but now it is widely accepted that robotic thyroidectomy is only a 'niche' operation even in a rich country like the United States. It has been established that robotic thyroidectomy will never be standard practice mainly due its cost and other problems. It is evidence based medicine that provided the information to establish this fact. There are many such examples.

I too wholeheartedly agree with Dr. Abeygunasekera that equitable health care is essential. However, if one were to concentrate only on equity and low cost care, then we may compromise on the essential treatment especially for those who cannot afford it, which is self-defeating.

The onus is on the medical community to assess the evidence and compel decision makers to provide the necessary facilities for the doctors to provide the best possible care for their patients. Yes, we must look at evidence based medicine critically, but what we must recommend is not only equity based medicine, but Evidence Based, Best Equitable Care for all.

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