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Editorial

Humour Me

The time will come when diligent research over long periods will bring to light things that now lie hidden. There will come a time when our descendants will be amazed that we did not know things that are so plain to them. Many discoveries are reserved for ages still to come, when memory of us will have been effaced. Our universe is a sorry little affair unless it has in it something for every age to investigate. Nature does not reveal her mysteries once and for all.

Lucius Annaeus Seneca
Natural Questions
Book 7,
First century AD.

In this edition there are two papers from the department of hepatobiliary surgery in the Mater hospital. The first considers biliary complications following cholecystectomy[1] and the second, hepatic portal venous gas[2]. It is fascinating to consider how far we have travelled in our understanding of matters hepatobiliary. Since Hippocrates in the 4th century BC, 'The Four Humours' were felt necessary for a proper balance of what Claude Bernard would later call 'Le Milieu Intérieur'. These four were 'Blood', 'Yellow Bile', 'Black Bile', and 'Phlegm'. Each was linked not only with the four Seasons; the four elements Earth, Fire, Water and Air (by Empedocles) but with the ancient names 'Sanguine','Cholic', 'Melancholic' and 'Phlegmatic', that represented courageous, angry, despondent, and unemotional behaviour respectively and of course, these vestigal descriptive characteristics still persist in the English language. Expelling an excess of one humour e.g. blood-letting or purging was the logical consequence of any perceived imbalance but with our sophisticated retrospectoscope, we look back, eyebrow raised, shoulders shrugged, in a 'what were they thinking?' kind of way. Those ancients: what fools.

What will future generations make of our medical interventions and therapies? Evidence-based, to be sure, but isn't there the vague sense of unease that decades from now, our Foundation doctors, well stricken in years, will explain to an impatient youth of tomorrow how things were done? Peter Kavanagh's paper on final year work-shadowing[3] and Alexandra Murphy's view from the standpoint of the Foundation doctor[4] present impressive descriptions of what our theological colleagues might call, 'The Now.' The *tour d'horizon* however, shifts continuously, and the Foundation doctor now faces a bewildering series of deanery, hospital and specialty decisions, unknown to this middle aged practitioner. Some years ago, at lunchtime (remember lunchtimes?), I was listening to several eminent colleagues, discussing their training years. What struck me forcibly at the time, was that not one of them ended up where they thought they would. One wonders if the same latitude is available to our Foundation doctor colleagues.

In his paper, ' Three Ulster Gentlemen[5]' a fourth Ulster gentleman, David Macafee considers the professional lives of three of his relatives, covering a working span of 90 years, from 1905 until 1995. That first decade of the 20th century saw the original installation of the stained glass window that graces our new Ulster Medical Society rooms, and this edition's cover, unveiled on 27th November, 1902, by the Earl of Dudley, having been commissioned for the library of the Ulster Medical Institute by Sir William Whitla. Two central characters are evident: William Smyth and Brendan McCarthy. Dr William Smyth was born on March 30, 1859. He clearly had a most robust constitution having contracted, and survived, both typhoid fever and smallpox at school and university respectively. His general medical practices were at Ardara and later Burtonport, in the Rosses, Co. Donegal.

In 1901, an outbreak of typhus occurred on the island of Arranmore, off Burtonport. Dr Smyth and Dr McCarthy, Medical Officer of Health for Co. Donegal were instrumental in the evacuation of sick patients from the island, but unfortunately Smyth contracted the disease. His typhus proved fatal and he died at the age of 42. He is buried in the parish graveyard in Dungloe beside six of his fourteen children. All six had died before the age of five. A man perhaps for all Seasons, and with a medical orthodoxy closer to 'The Four Humours' than he might have cared to admit. The circumstances of his work, life, death and that of his young children stand mute witness from the past. It is salutary to consider that all he accomplished he did without a job plan. Sanguine, indeed.

Have a wonderful summer. Do keep sending me your good papers.

Barry Kelly
Honorary Editor.

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Paper

Endoscopic Ultrasound in Barrett's Oesophagitis with Dysplasia

Andrew Wray[1], Paul Rice[2], Mark Love[1]

Accepted 30 January 2012

Purpose: With the advent of conservative therapies including photodynamic therapy and endoscopic mucosal resection for Barrett's and high grade dysplasia, accurate staging has become increasingly important. We report our experience with endoscopic ultrasound (EUS) in these patients.

Materials and Methods: Retrospective review of 25 consecutive patients referred for EUS for assessment of Barrett's with high grade dysplasia and /or stricture or polyp. The findings were compared with subsequent surgical pathology, or endoscopy and biopsy follow up.

Results: Nine patients were found to have invasive tumour on EUS and this was confirmed in all 9 either by oesophagectomy, OGD and oncology follow up, or by endoscopic mucosal resection.

Eight patients underwent oesophagectomy, 5 for invasive tumour and 3 for dysplasia only, with pathological agreement with EUS findings in 7 out of 8 cases. The one discrepancy was a EUS case of mucosal thickening only with no invasion, but pathology showed a T1 lesion.

Thirteen patients with no evidence of invasion were managed conservatively, with 11 patients being followed up for 6-12 months with serial OGD and biopsy, and no cases of more invasive disease occurring.

Therefore, in our experience the sensitivity, specificity and positive predictive value of EUS in complex Barrett's is 90%, 100% and 100% respectively.

Conclusion: EUS is valuable in the assessment of high grade dysplasia in cases where conservative therapy is being considered, defining those with more deeply invasive tumour for whom radical treatment is the only option.

Key Words: Endoscopic ultrasound, Barrett's metaplasia, Oesophagus

INTRODUCTION

Barrett's oesophagitis is defined as metaplasia within the distal oesophagus from squamous to columnar epithelium in response to prolonged gastro-oesophageal reflux. This has the potential to develop dysplasia and subsequently invasive malignancy. The risk of adenocarcinoma in simple Barrett's has been estimated at 1% per year, however with high grade dysplasia this rises to 4.7%. This risk is also elevated where Barrett's is associated with a stricture or mass[1].

Previously, high grade dysplasia within an area of Barrett's was an indication, in suitably fit patients, for oesophagectomy. This however has a significant morbidity and mortality rate. Recently, endoscopic treatments such as photodynamic therapy (PDT), which involves the administration of various photosensitive agents and subsequent laser exposure, as well as endoscopic mucosal resection (EMR) have been developed. These allow high grade dysplasia, or in some cases early invasive malignancy, to be managed more conservatively with similar outcome to oesophagectomy[2, 3].

This is dependent on accurate staging as more deeply invasive disease is not adequately managed with local treatments and can often be missed by endoscopic biopsy alone.[4]

Endoscopic ultrasound (EUS) is well documented to accurately demonstrate the layers of the oesophageal wall (Figure 1), leading to accurate local staging of malignant oesophageal disease[5, 6].

The purpose of this study was to evaluate our experience of the use of EUS in patients with Barrett's oesophagitis and dysplasia.

MATERIALS AND METHODS

We retrospectively reviewed our use of EUS in twenty five consecutive cases of complex Barrett's oesophagitis, that is those associated with high grade dysplasia, or dysplasia with a mass or stricture. These cases were performed by two consultant radiologists with an interest in EUS in two centres between January 2005 and September 2007 using radial electronic echoendoscopes (Pentax EG/3630UR, Hitachi

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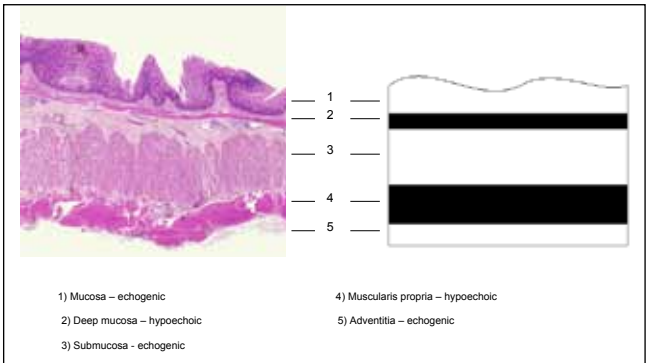

Fig 1. Histological and schematic findings of normal oesophageal wall at EUS

Medical Systems, UK and Olympus MH 908, Olympus, USA). The radiology, pathology and endoscopy records of these patients were reviewed. The EUS findings were compared with any subsequent oesophagectomy pathology specimen, or with subsequent endoscopy and biopsy follow up.

The local ethics committee was consulted but advised that full ethical approval was not required for such a retrospective study.

RESULTS

25 consecutive patients who had undergone EUS were studied. This comprised 22 males and 3 females, with a mean age of 63 years (range 37 – 83 years). All were referred for assessment of known Barrett's oesophagus. The indications are summarised in Figure 2.

Indication	Number of patients
High grade dysplasia	15
Mass or stricture	5
Suspicious biopsy	3
Dysplasia, query grade	1
Previous PDT	1

Fig 2. Indication for EUS
All patients had proven Barrett's oesophagitis in addition to the above.

The EUS in 9 of these patients was reported as showing probable invasive tumour, and a T stage was assigned (Figures 3-5). Asymmetric or focal thickening of the mucosal layer on EUS was deemed T1 disease, with disease which invading the muscularis propria (T2), and beyond (T3, T4) being more easily recognised. Invasive tumour was confirmed in all 9 cases. 5 underwent oesophagectomy with pathological confirmation. One patient underwent endoscopic mucosal resection where the pathology confirmed the EUS findings of a T1 lesion. 3 patients underwent oncology and palliative care management after subsequent repeat endoscopic biopsy had indicated the presence of invasive tumour, again confirming the EUS findings.

In 16 cases, no significant abnormality or only slight generalised mucosal thickening was seen on EUS. In one

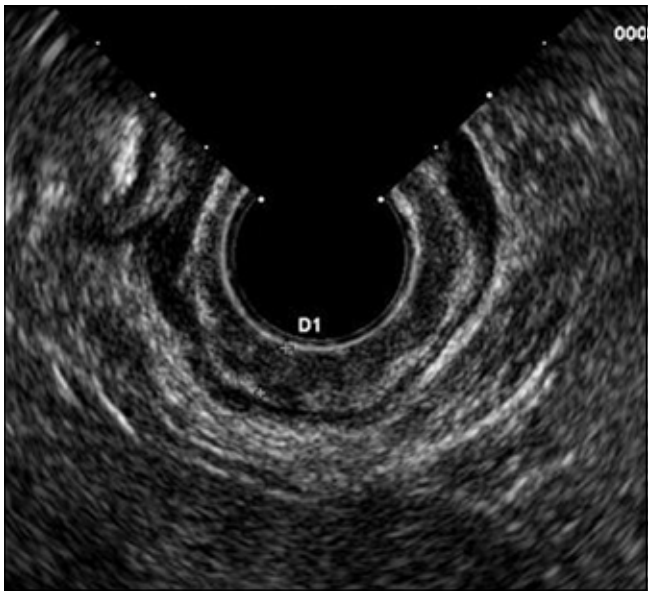

Fig 3. T1 lesion
T1 lesion, with hypoechoic muscularis propria layer be intact throughout

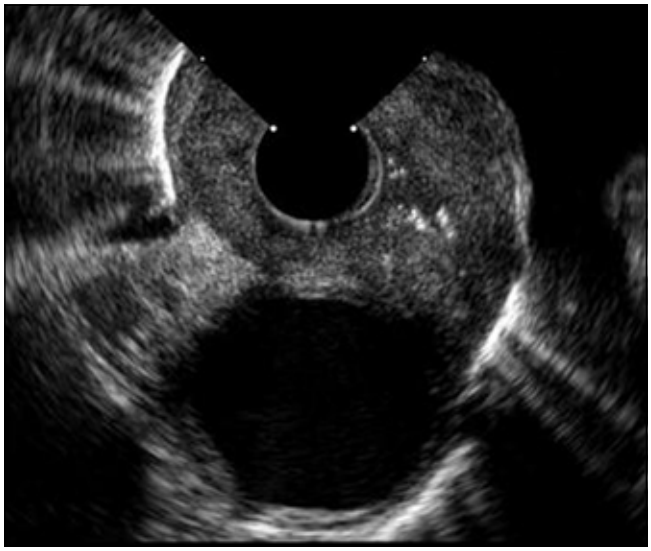

Fig 4. T4 lesion
T4 lesion, with mass seen to invade aortic wall (hypoechoic aorta seen at 6 o'clock, normal five layered oesophageal wall replaced by mass)

EUS stage	n = 9
T1	4
T2	3
T3	1
T4	1

Fig 5. T stage assigned by EUS to those in which invasive tumour was suspected.

of these cases, where the indication was Barrett's and an associated polyp, the findings were less conclusive. There was EUS suspicion of muscularis mucosa invasion, however this was a complex case with a history of oesophageal surgery as an infant, and the subtle EUS findings overall were assessed as

not being significant. 13 patients in this EUS "non invasive" group were treated conservatively. 11 of these were followed up with serial endoscopy and biopsy for between 6 months and 1 year. The other 2 patients were not followed up with serial endoscopy because of medical comorbidity. No cases of invasive tumour occurred in these 13 patients up to one year after the EUS examination. One conservatively managed patient who underwent PDT subsequently developed invasive tumour, however this occurred 29 months after the EUS examination. Only 3 patients underwent oesophagectomy in this group. High grade dysplasia was confirmed pathologically in 2 cases. There was however 1 case in which the pathology showed one small focus of invasion consistent with a T1 tumour.

Of the total 25 patients, 8 subsequently underwent oesophagectomy. The pathology matched the EUS findings in 7 of these cases, 5 of which had invasive malignancy and 2 had high grade dysplasia only. Therefore, comparing our EUS findings to histology or prolonged follow up of 6 months to 1 year, EUS has a sensitivity of 90%, a specificity of 100% and a positive predictive value of 100% for invasive disease not suitable for conservative management (Figure 6).

	No. of Patients
EUS true +ve (pathology or clinical confirmation)	9
EUS false +ve (pathology confirmation)	0
EUS false –ve (pathology confirmation)	1
EUS true –ve (pathology or 6-12 months follow up)	13

Fig 6. Summary of results
Sensitivity 90%, Specificity 100%, Positive predictive value 100%

DISCUSSION

The finding of high grade dysplasia in an area of Barrett's oesophagitis was previously an indication for oesophagectomy, More recently, endoscopic treatments including photodynamic therapy (PDT) and endoscopic mucosal resection (EMR), have been shown to be effective in the management of high grade dysplasia and indeed superficial carcinomas. Recent NICE guidelines have stated that such treatments have become established and PDT has been shown to downgrade high grade dysplasia in 77-98% of cases[7]. However, in a suitably fit patient, oesophagectomy is still the gold standard treatment for Barrett's oesophagitis with high grade dysplasia.

Barrett's oesophagitis with dysplasia is traditionally followed up and staged by serial OGD and biopsy for the early detection of invasive disease. There is however a significant sampling error with this. Falk et al showed that invasive tumour was present in up to 40% of oesophagectomy specimens carried out for what was believed to be high grade dysplasia only on multiple endoscopic biopsies- ie. biopsy alone significantly under calls more invasive disease[4]. This is dramatically illustrated by one of our cases referred with high grade dysplasia only, which was found on EUS to have a T4 tumour.

EUS is able to delineate the separate histological layers of the oesophagus and has become well established as the gold standard method for preoperative local staging of oesophageal carcinoma.

EUS has not been shown to be effective in diagnosing dysplasia within an area of Barrett's and it is not recommended for this purpose[8, 9]. It is however indicated where dysplasia is established and conservative (non-surgical) treatment is being considered.

In our study we have compared our EUS findings to the standard of either histology or prolonged clinical follow up. We have used a time scale of 6 – 12 months as our follow up standard because these patients undergo OGD and biopsy follow up with a frequency ranging from 3 monthly to annually depending on clinical suspicion. The development of invasive disease from high grade dysplasia is a continuum and therefore to compare the EUS findings with more prolonged follow up is not relevant. This is illustrated by one conservatively managed case, treated with PDT, that ultimately developed invasive disease. This occurred 29 months after the EUS, but this does not represent a misdiagnosis as the EUS findings are only relevant for the initial decision about conservative management.

Also, although a number of these patients underwent photodynamic therapy, it can still be concluded that the EUS findings were accurate as photodynamic therapy is only effective at treating mucosal and early submucosal disease. Therefore if a case with more advanced disease had been missed on EUS it would have been expected to re-present with more invasive disease.

The EUS findings correlated with the surgical pathology in 7 out of 8 cases and the one discrepancy was an under called area of submucosal invasion (T1 lesion). This case does however highlight some of the limitations of EUS in Barrett's with early cancer, and raises issues as to our future management of these patients.

The difficulty of EUS is distinguishing between background simple Barrett's inflammatory change and early mucosal invasive tumour, both of which will show thickening of the mucosal layer only on EUS.

If conservative management is being considered then knowing the precise degree of submucosal extension is important because of the risk of lymph node metastases. For disease limited to the mucosa (T1a) this risk is virtually 0%, however for submucosal disease (T1b) this rises to 16-22%[10, 11]. Obviously local treatments are not suitable for cases where there is significant risk of lymph node metastases.

Endoscopic ultrasound is excellent at diagnosing invasive disease which is T2 and beyond. However EUS is well recognised to be limited in distinguishing between high grade dysplasia and T1a and T1b disease. High frequency EUS probes (20-30MHz) have been advocated for this however a number of studies have not shown this to be accurate in the detection of T1b disease[12-14]. May et al[15] showed the diagnostic accuracy of submucosal staging with high resolution endoscopy and high resolution EUS to be similarly inaccurate, with sensitivities of only 56% and 48% respectively.

Endoscopic mucosal resection should therefore be considered in all potentially conservatively managed cases. EMR provides additional pathological staging, in particular providing accurate information with respect to submucosal invasion, were EUS underperforms[16]

EMR has also been shown to adequately treat high grade dysplasia as well as certain favourable cases of T1a disease. A recent review by the Society of Thoracic Surgeons concluded that it was reasonable to treat discrete mucosal disease with EMR. However they also stated that as Barrett's is often multifocal this should be complemented with a mucosal ablative procedure, for example PDT, to completely eradicate disease[17].

CONCLUSION

Despite our promising figures we recognise, in common with others, the inability of EUS to distinguish dysplasia from early invasive tumour, even that involving submucosa. Given this it seems unlikely that our present level of success could be consistently sustained over a larger number of cases.

Clearly the weakness of this study relates to the small patient numbers and the high rate of conservative management preventing further definitive pathological correlation in more of the cases.

However, as conservative treatments become increasingly used for the treatment of high grade dysplasia in Barrett's oesophagitis, and given the high positive predictive value of EUS for the diagnosis of more deeply invasive disease, the authors feel that EUS retains an important role in patients with high grade dysplasia prior to EMR or PDT, in detecting unexpectedly advanced disease which clarifies the need for surgery or neoadjuvant treatment.

The authors have no conflict of interest.

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Paper

Hepatic portal venous gas – three non-fatal cases and review of the literature

Kevin McElvanna, Alastair Campbell, Tom Diamond

Accepted 26 January 2012

ABSTRACT

Background: Hepatic portal venous gas is a rare imaging finding most commonly associated with intestinal ischaemia and high mortality. Increased use of advanced imaging techniques has resulted in increased reporting and recognition of hepatic portal venous gas. Advanced imaging can also recognise the many associated pathologies which have variable management strategies and prognoses.

Methods: We report 3 non-fatal cases and review the pathogenesis, aetiology, diagnosis, management and prognosis of hepatic portal venous gas.

Conclusion: Once considered an indication for urgent surgery, hepatic portal venous gas is a rare imaging finding. More recently, HPVG has been recognised to be associated with various benign causes many of which may be treated non-operatively. However, intestinal ischaemia remains the most common cause and the most important to exclude. CT is the diagnostic modality of choice. The underlying cause determines the treatment strategy and outcome.

BACKGROUND

Hepatic portal venous gas (HPVG) is a rare imaging finding first described in 1955 in neonatal necrotising enterocolitis[1]. A subsequent review of adult cases concluded that this was an ominous finding – usually indicating intestinal ischaemia, necessitating urgent laparotomy and mortality of 75%[2]. In more recent decades, in particular with the advent of computed tomography (CT), HPVG has been increasingly recognised. It has been associated with various abdominal pathologies and a lower overall mortality than previously reported. We report 3 non-fatal cases and review the pathogenesis, aetiology, diagnosis, management and prognosis of HPVG.

METHOD

The clinical notes and imaging of 3 non-fatal cases of HPVG recently diagnosed in our hospital were reviewed. PubMed, PubMed Central and BioMed Central databases were searched using the terms 'hepatic portal venous gas' and 'portal venous gas'. A literature review of articles in the English language regarding HPVG in adults was conducted. References cited in articles were also reviewed and 45 relevant articles were selected.

CASE 1: HPVG WITH ACUTE PANCREATITIS AND GASTROINTESTINAL DILATATION

A 76-year-old man was admitted with upper abdominal pain radiating through to the back and vomiting. He had a history of alcohol excess, liver cirrhosis and ischaemic heart disease. Physical examination revealed tachycardia and right hypochondrial tenderness. Laboratory data showed deranged liver function and hyperamylasaemia of 984 U/l (25-125 U/l). A diagnosis of acute pancreatitis was made and abdominal ultrasonography was performed to exclude gallstones. This showed gallbladder sludge, a distended stomach and gas bubbling through the hepatic portal veins (Figure 1). CT demonstrated gross fluid distension of the oesophagus, stomach, duodenum and proximal jejunal loops. Gas was seen within the mesenteric and hepatic portal veins (Figure 2). No biliary or pancreatic abnormality was identified.

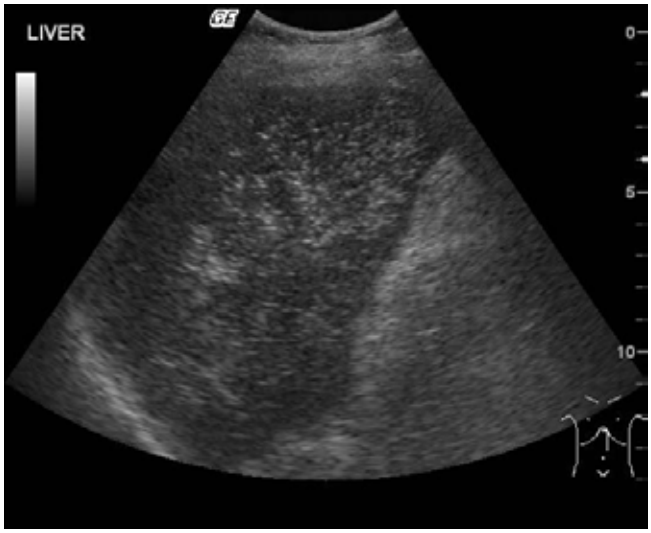

Fig 1. Multiple non-shadowing echogenic foci consistent with intrahepatic portal venous gas.

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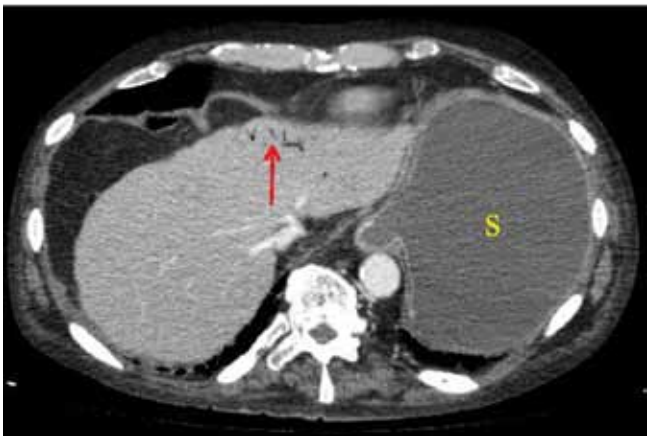

Fig 2. Branching low-attenuation areas within 2cm of the left hepatic lobe capsule in keeping with HPVG (red). Markedly distended and fluid-filled stomach (S).

The patient was treated with nasogastric decompression, intravenous fluids and analgesia. A gastrografin meal and follow-through at 6 days showed a normal calibre stomach and small bowel. His symptoms resolved and he was discharged after 9 days.

CASE 2: HPVG WITH ABDOMINAL HAEMATOMA AND GASTRIC DILATATION

A 44-year-old female underwent an elective Roux-en-Y hepaticojejunostomy for a benign biliary stricture. Four days post-operatively she developed right-sided abdominal pain and vomiting. On examination she was found to be pale, tachycardic and hypotensive. Laboratory investigations revealed: haemoglobin of 7.2 g/dl (11.5-16.5 g/dl), leukocytosis of 35.2x10^9/l (4.0-10.0 x10^9/l) and elevated C-reactive protein of 459mg/l (1-10mg/l). Two units of packed red cells were transfused and intravenous antibiotics were commenced.

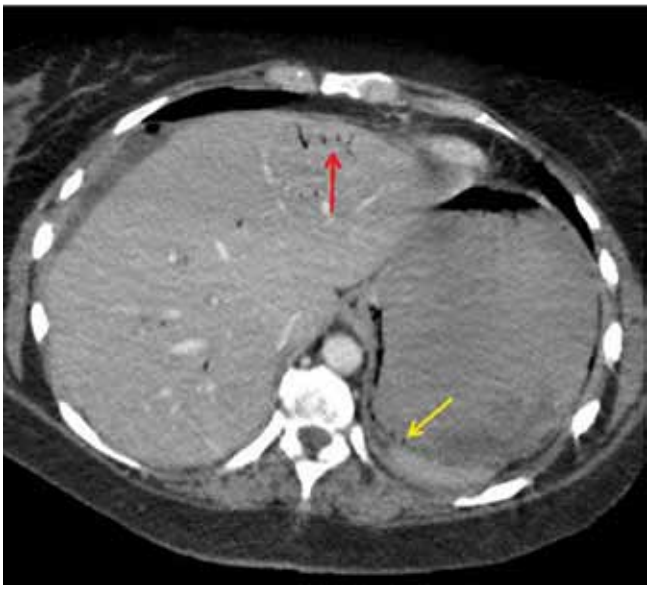

Fig 3.
Intra-abdominal haematoma (H). Linear gas collections (yellow) within the gastric wall consistent with gastric pneumatosis. HPVG in the anterior periphery of the left lobe (red) .Gas within the medial gastric wall (yellow).

Abdominal CT showed a large right-sided intra-peritoneal haematoma. The stomach was markedly distended and gas was seen within the wall of the stomach and oesophagus. Gas was identified peripherally within both lobes of the liver (Figure 3).

Naso-gastric decompression and urgent laparotomy were performed. The haematoma was evacuated, haemostasis achieved and a further drain inserted. The stomach did not appear ischaemic. The naso-gastric tube was removed 2 days later and a further CT at 4 days showed resolution of the gastric distension, pneumatosis and HPVG. The patient was discharged 6 days later.

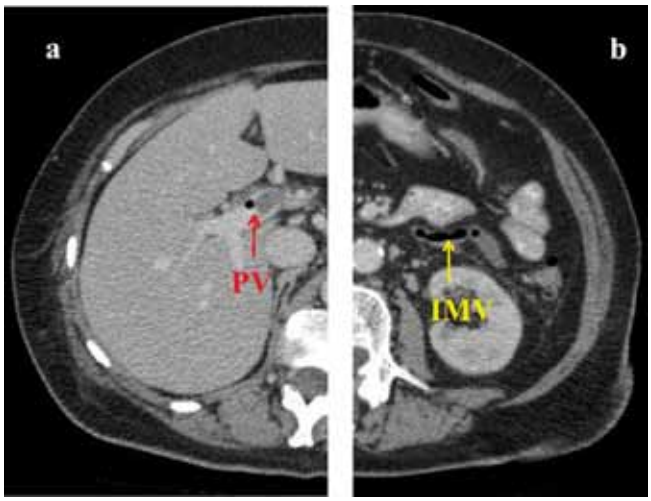

Fig 4.
a. Gas and thrombus in the portal vein (PV)
b. Gas in the inferior mesenteric vein (IMV)

CASE 3: HPVG WITH ACUTE DIVERTICULITIS, INTRA-ABDOMINAL ABSCESS & SEPTIC THROMBOPHLEBITIS

A 67-year-old female presented with lower abdominal pain, vomiting and rigors. She had a past history of superior mesenteric venous thrombosis 9 years previously resulting in mesenteric infarction necessitating ileo-caecal resection followed by anti-coagulation for 6 months. Pulse rate was 128/min, blood pressure 103/59mmHg and temperature 37.8°C. She had left iliac fossa tenderness on examination. Laboratory data revealed a white cell count of 11.7x10^9/l (4.0-10.0 x10^9/l) and C-reactive protein of 363 mg/l (1-10 mg/l). CT of the abdomen and pelvis identified sigmoid diverticulitis with an adjacent 3.2cm gas and fluid-filled collection consistent with a diverticular abscess. Inferior mesenteric, splenic and portal venous gas was evident (Figure 4). There was also peripheral intra-hepatic portal venous gas (Figure 5). A filling defect was seen within the inferior mesenteric and extra-hepatic portal veins in keeping with thrombus and a diagnosis of septic thrombophlebitis. Blood cultures were positive for Pseudomonas stutzeri and Streptococcus milleri.

She was treated with therapeutic low-molecular weight heparin and intravenous meropenum and gentamicin. Her symptoms resolved, inflammatory markers improved and she was discharged 2 weeks later on lifelong oral anticoagulation.

PATHOGENESIS

The mechanism of HPVG is not fully understood. Theories include: (i) migration of swallowed gas via mural capillaries into the portal venous circulation due to high gastrointestinal luminal pressure. This is the most likely mechanism in Cases 1 and 2 where marked gastric dilatation appear to have been precipitated by pancreatitis and intra-abdominal bleeding respectively; (ii) disruption of intestinal mucosa with passage of gas into the mesenteric venous system from gas-forming organisms within the bowel lumen; (iii) the presence gas-forming bacteria either from an abscess or porto-mesenteric pyelophlebitis[2-5]. In Case 3, where there was diverticulitis with an associated abscess, both theories (ii) and (iii) could explain the development of portal venous gas. In many cases these factors appear to contribute in combination[6]. Gas within the portal vein then passes centrifugally via the intra-hepatic portal veins to the hepatic periphery.

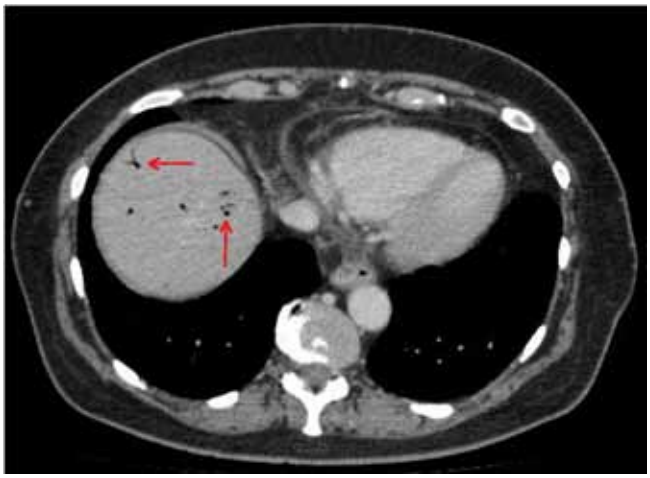

Fig 5. HPVG in the superior periphery of the right hepatic lobe.

AETIOLOGY

Mesenteric thrombosis with intestinal necrosis is still the most common underlying cause and the most important diagnosis to exclude. Recent studies have recognised other common pathologies associated with HPVG (Table 1) [3,6,7]. Many other causes have been reported and together account for approximately 15% of cases (Table 2).

DIAGNOSIS

HPVG is a rare imaging finding - just 28 cases were identified on review of 33,000 CT scans in 2 centres[33,34]. It is typically identified on plain x-ray, ultrasonography (US) or CT. The clinical presentation and examination findings are those of the underlying aetiology.

PLAIN RADIOGRAPHY

HPVG was originally described as a plain radiographical sign. It appears as branching radiolucencies extending to the liver periphery[2]. It may be detected in up to 12.5% of cases but requires the presence of large quantities of gas and is often a subtle finding[5,6,35]. A left lateral decubitus view increases sensitivity[2]. The presence of HPVG on plain x-ray has been considered a poor prognostic sign, usually associated with intestinal infarction[4,5]. Features of the underlying cause may also be evident such as marked pneumatosis intestinalis, gastro-intestinal oedema and dilatation or paucity of luminal gas.

Common causes of HPVG[3,4,7]

Intestinal necrosis	43-70%
Gastrointestinal dilatation	9-12%
Gastric dilatation	
Ileus	
Mechanical obstruction	
Pseudo-obstruction	
Gastrointestinal inflammation	8-16%
Diverticulitis	
Inflammatory bowel disease	
Sepsis	7-11%
Intra-peritoneal abscess	
Septic thrombophlebitis	
Endoscopic procedures	2-4%
Colonoscopy	
ERCP	
Percutaneous gastrostomy	
Ultrasonic biopsy	
Variceal banding/sclerotherapy	
Peptic ulcer disease	4%
Blunt trauma	3%
Abdomino-pelvic malignancy	2-3%
Oesphago-gastric carcinoma	
Colonic carcinoma	
Leiomyosarcoma	
Ovarian carcinoma	

US

On ultrasound scanning, HPVG appears as hyper-echoic, dot-like or streak-like foci flowing within the portal veins or liver parenchyma[7,36]. It is a rapid, low-cost, low-radiation method with comparable sensitivity and accuracy to CT[4]. Sensitivity may be increased if colour Doppler flow imaging is also utilised[37,38]. US also offers dynamic imaging of the centrifugal flow of portal gas to the hepatic periphery thus differentiating from biliary gas[39].

CT

With the increased use of abdominal CT scanning, HPVG has been more frequently diagnosed. Small volumes of gas can be detected and the application of 'lung-window' settings aids identification[4,5,34]. Gas is predominantly seen within the portal veins of the non-dependant left lobe and anterior right lobe[3,34,40]. Branching low-attenuation tubular areas are seen within 2cm of the hepatic capsule[6]. HPVG can be distinguished from intra-hepatic pneumobilia which is

detected centrally within the liver rather than extending to the peripheral parenchyma. It is highly sensitive and considered the gold standard imaging modality as it also offers the advantage of early detection of associated pathology[3,5,37]. In particular, dilatation and inflammation of the digestive tract, intra-peritoneal abscess and features of bowel ischaemia, such as pneumatosis intestinalis, may be demonstrated.

Other reported causes of HPVG (~15%)

Iatrogenic
- Barium enema[8]
- Cardiopulmonary resuscitation[9]
- Gastrojejunostomy leak[10]
- Haemodialysis[11,12]
- Hepatic artery embolisation[13]
- Intra-aortic balloon pulsation[14,15]
- Liver transplantation[16]
- Percutaneous liver biopsy[17]
- RF ablation of liver metastases[18]

Pancreaticobiliary
- Cholangitis[19,20]
- Pancreatitis[21]

Drugs
- Chemotherapy[22,23]
- Colchicine toxicity[24]

Miscellaneous
- Bronchopneumonia[25]
- Caustic ingestion[26]
- Cryptosporidium[27]
- Cystic fibrosis[28]
- Diabetic ketoacidosis[29]
- Emphysematous pyelonephritis[30-32]
- Hyperbaric decompression[33]
- Seizures[34]

MANAGEMENT AND PROGNOSIS

Early studies concluded that the diagnosis of HPVG was an ominous finding which necessitated urgent laparotomy. This was due to the association with bowel infarction and high mortality of at least 75%[2]. With advanced imaging techniques and the reporting of many non-life-threatening causes, subsequent authors questioned the need for immediate surgery[41-43]. More recent studies report an overall mortality of 29-39%[6,33,43]. The apparent decrease in mortality can be explained by the increased usage and sensitivity of CT. Early detection of HPVG and the identification of the precipitating diagnosis have facilitated timely and targeted treatment. Rather than being an indication for surgery, the presence of HPVG should be considered a diagnostic sign.

All three patients we present had clinical presentations indicating significant intra-abdominal pathology. The decision whether to operate or treat conservatively was based on careful correlation of the clinical, laboratory and radiological findings. In Case 2, with evidence of significant post-operative bleeding and possible gastric ischaemia, urgent laparotomy was indicated. Conservative management was adopted in the other cases. In Case 1, the history of excessive alcohol ingestion, pain radiating to the back, combined with hyperamylasaemia and the absence of gastrointestinal pneumatosis suggested a diagnosis of pancreatitis rather than mesenteric ischaemia. Conservative management with regular re-assessment was therefore indicated. The patient in Case 3 again was treated conservatively, primarily on clinico-radiological evidence of locally complicated diverticulitis rather than generalised peritonitis and the absence of CT signs of intestinal ischaemia. It is recognised that CT cannot definitively exclude or confirm intestinal ischaemia, however in the clinical context of these two cases, surgery was felt to be unjustified.

Management algorithms have been proposed[3,4]. Indications for immediate surgery include clinical and/or radiological signs of intestinal necrosis (75-85% mortality) and the presence of HPVG on plain x-ray (75% mortality)[5]. Close monitoring and a low threshold for surgery are advised in patients with gastro-intestinal distension, ulceration or abscess without peritonitis, as mortality approaches 20-30%[2,6]. Mortality in the remaining group of 'benign' aetiologies is extremely low. A conservative approach may be adopted in these cases[3,4]. This combines close observation, intravenous fluid, antibiotic therapy, and naso-gastric decompression when required.

CONCLUSION

Once considered almost pathognomic of intestinal necrosis, high mortality and an indication for urgent surgery, HPVG is a rare imaging finding. More recently, it has been associated with various non-fatal causes as demonstrated by the cases we have reported. However, intestinal ischaemia remains the most common cause. CT is the diagnostic modality of choice. The underlying cause of HPVG determines the treatment strategy and outcome.

The authors have no conflict of interest.

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Paper

Biliary complications during a decade of increased cholecystectomy rate

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Abstract

Background: Bile duct injury is a rare complication of cholecystectomy. The aims of this study were to analyse the mechanism and outcome of biliary complications and determine the Northern Ireland incidence of bile duct injury over the last decade.

Methods: Annual numbers of cholecystectomies were obtained from the Northern Ireland Hospital Inpatient System database. Bile duct injury referrals to a hepatobililary unit over an 11-year period from 2000 were reviewed. Mechanism and recognition of injury, referral interval, management and outcome were analysed.

Results: The annual incidence of laparoscopic cholecystectomy in Northern Ireland increased from 0.038% in 1995 to 0.101% in 2009. Thirty-five patients with biliary complications from cholecystectomy were referred from 2000. The incidence of bile duct injury associated with laparoscopic cholecystectomy during this period was 0.2%. Only 26% of injuries were recognised intra-operatively, only 40% were referred immediately and 91% required operative intervention.

Conclusion: The incidence of laparoscopic cholecystectomy has increased in Northern Ireland. The incidence of bile duct injuries over the last 11 years was 0.2%. Recognition and referral were delayed in most cases. The majority of injuries required operative management and long-term follow-up.

Keywords: Bile duct injury, Cholecystectomy, Laparoscopic Cholecystectomy

INTRODUCTION

Bile duct injury during cholecystectomy is an iatrogenic catastrophe associated with significant morbidity, mortality, adverse quality of life and high rates of litigation[1]. Laparoscopic cholecystectomy is now considered the gold standard treatment for symptomatic gallstones. Higher rates of bile duct injury have been reported in the laparoscopic era[2].

The aims of this study were to determine the incidence of biliary complications following cholecystectomy in Northern Ireland and review the mechanism, recognition, referral, management and outcome of biliary injuries.

PATIENTS AND METHODS

Population-based information was collected from the "Hospital Inpatient System" (HIS) in Northern Ireland to determine the annual incidence of benign biliary surgical practice since records commenced in the province in 1995. Northern Ireland has a relatively stable population and a single Hepatobiliary unit. Patients referred to this unit for the management of bile duct injuries sustained at cholecystectomy during the last 11 years were identified and their case notes reviewed.

The mechanism and recognition of injury, referral interval, management and outcome were analysed. The calculation of the incidence of bile duct injury was made based on the total number of bile duct injury referrals to the Hepatobiliary unit and the total number of laparoscopic cholecystectomies carried out in Northern Ireland over this period.

RESULTS

Incidence of cholecystectomy & biliary complications

The population of Northern Ireland increased by approximately 6% during the last decade. The annual incidence of laparoscopic cholecystectomy almost trebled from 0.038% in 1995 to 0.101% in 2009. Open cholecystectomy rates have remained relatively stable (figure 1).

Over an 11-year period from 2000, 35 patients with bile duct injuries sustained during cholecystectomy were referred. There were 21 female and 14 male patients with a mean age of 51.1 years (range 19-81 years, median 51 years). Injuries were classified according to the Strasberg *et al* method[3] (table 1).

The incidence of bile duct injury associated with laparoscopic cholecystectomy was 0.2%.

Surgery, recognition and time of referral

Twenty-eight injuries were sustained during laparoscopic cholecystectomy (of which 8 were recognised and converted to open). One injury was sustained after open conversion and was recognised intra-operatively. A further 4 patients had laparoscopic converted to open cholecystectomy but the

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injury was not recognised until the post-operative period. Two injuries were sustained at open cholecystectomy – both of which were recognised post-operatively. A consultant surgeon was the principal operator in all but one case.

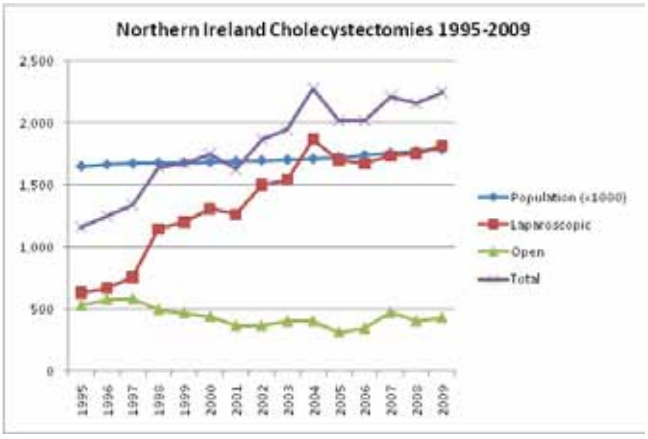


Fig 1. Annual numbers of cholecystectomies in Northern Ireland 1995-2009

Only 9 injuries were recognised at the time of surgery, 1 of which was diagnosed on cholangiography – the only intra-operative cholangiogram performed in this series. Fourteen cases were referred immediately (within 7 days of injury). Thirteen cases were 'early' referrals (within 6 weeks) and the remaining 8 injuries were considered 'late' referrals (after 6 weeks).

PRESENTATION, MANAGEMENT & OUTCOME

Type A - 6 patients

Four patients had a cystic duct stump leak (without distal bile duct obstruction) (figure 2). Two patients had leaks from a minor radical duct in the gallbladder fossa. One patient presented with abdominal pain after 2 weeks and had percutaneous drainage of a bile collection with no persistent leak on follow-up MRCP. Five presented with biliary peritonitis in the early post-operative period and 1 was also jaundiced. Laparotomy and placement of drains were performed in 5 cases. Oversewing of a leaking radical duct was carried out in 1 patient. In 1 case, laparotomy was eventually performed after unsuccessful laparoscopic drainage and ERCP. One patient required ERCP and stenting after open drainage. All patients made a good recovery, remaining asymptomatic with normal liver function tests during follow-up periods ranging from 6 weeks to 36 months.

Type B

There were no Type B injuries.

Type C – 1 patient

This patient presented 3 weeks post-operatively with a biliary leak and jaundice. ERCP showed leak of contrast with no filling of the right intrahepatic ducts. A stent was placed and removed 1 year later. Follow-up MRCP suggested a persistent bile leak and less prominent right intrahepatic ducts. On referral to the Hepatobiliary unit, management was conservative as the patient was asymptomatic with normal liver function tests. He remains well at 3 years.

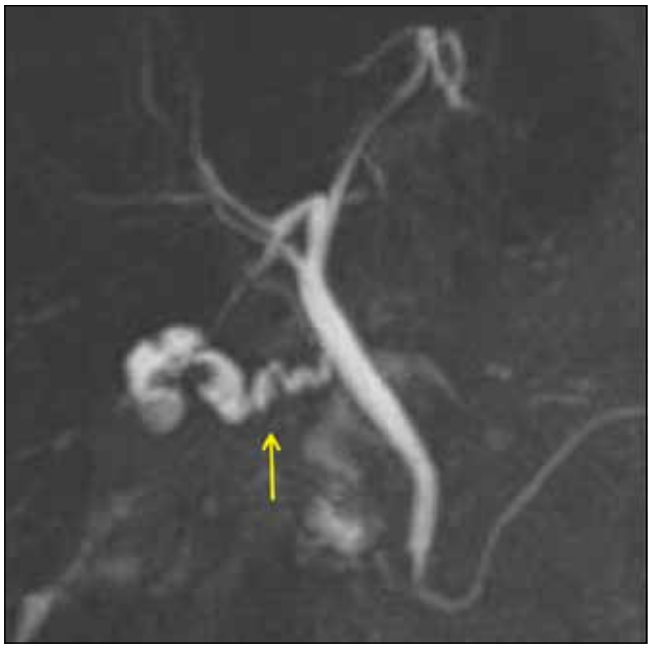


Fig 2. MRCP demonstrating a Type A cystic duct leak

Type D – 6 patients

One Type D injury was recognised intra-operatively and after open conversion a T-tube and large drain were inserted. A further laparotomy with T-tube replacement and drainage was performed due to biliary peritonitis. Although MRCP at 8 months showed a slight kink in the hepatic duct there were no symptoms or biliary obstruction and liver function tests were normal.

One patient presented post-operatively with a significant bile leak from the drain and was successfully treated with ERCP and stenting. The other 4 patients, 1 of whom was also jaundiced, presented with biliary peritonitis. Of these, 2

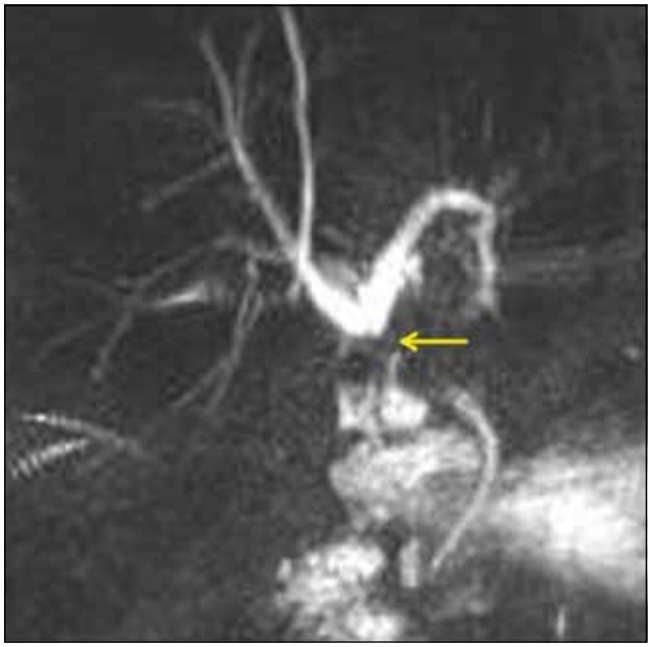


Fig 3. MRCP demonstrating a Type E3 injury. This required hepaticojejunostomy.

had failed endoscopic stenting and all 4 required laparotomy. One patient had a choledochojejunostomy performed at 9 days by the primary surgeon. This was revised after 2 weeks before referral to the Hepatobiliary unit where she was treated conservatively for a persistent bile leak and sepsis. Two patients had T-tube insertion and 1 injury was suture repaired. Follow-up ranged from 2-8 years. Three patients complained of persistent pain during follow-up but liver function tests in all cases were satisfactory.

Type E – 22 patients

Eight type E injuries were recognised intra-operatively - 1 occurring after conversion to open. Four had primary suture repair over a T-tube by the initial surgeon. One of these required a hepaticojejunostomy after 1 year for a Bismuth type 3 stricture. One patient developed a stricture at 1 year requiring hepaticojejunostomy at 5 years. Both remain well after 7 and 3 year follow-up respectively. The other 2 patients are well with no stricture at 2 and 4 years.

The other 4 recognised injuries were referred for immediate hepaticojejunostomy. Three of these patients also had associated vascular injuries to the right hepatic artery. Two of these were well with normal liver function after 2 years. The other patient (who also had repair of a transected right hepatic artery) had mild derangement of liver function but remains asymptomatic after 2 years.

Eleven type E injuries presented in the early post-operative period (figure 3). Eight patients presented with biliary peritonitis of which 2 were also jaundiced. The other 3 presented with painless jaundice. Four were referred immediately, 4 early and 3 were considered late referrals. All required hepaticojejunostomy. One had a hepaticojejunostomy performed by the primary surgeon which strictured after 3 years requiring revision. One patient also had an injury to the right hepatic artery and developed hepatic necrosis, anastomotic stricturing, cirrhosis and ultimately required a right hepatectomy. One patient has been treated conservatively for intermittent cholangitis since surgery. The remaining 9 patients are well with normal liver function during follow-up periods ranging from 2 months to 9 years.

The remaining 3 injuries presented with jaundice/ cholangitis later in the follow-up period. All were found to have a stricture on ERCP, requiring stenting. One required hepaticojejunostomy 10 years after cholecystectomy and is well with normal LFTS. Another had hepaticojejunostomy performed after 1 year and is well after 1 year follow-up. The remaining patient has not required operative intervention after 5 years of follow-up.

Hepaticojejunostomy (Blumgart technique) was performed in patients requiring biliary reconstruction[4]. A retrocolic Roux-en-Y jejunal loop was anastomosed to the bile duct confluence after extending the left hepatic duct opening to maximise the anastomotic circumference. One patient also required re-implantation of the right posterior sectoral duct.

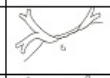
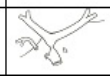
DISCUSSION

The rate of cholecystectomy continues to rise since the introduction of the laparoscopic approach. The incidence of bile duct injury associated with laparoscopic cholecystectomy in Northern Ireland over the last decade was 0.2% - lower than reported rates of 0.4-0.7%[2].

Calculation of the incidence of biliary injury was based on the assumption that all patients were referred to the Hepatobiliary unit. Whilst it is likely that all major injuries were referred it must be recognised that further complications such as minor Type A leaks may have been managed at the primary hospital without referral to the Hepatobiliary unit.

TABLE 1

Classification of bile duct injuries referred 2000-2010

Strasberg Classification		Description	N
A		Minor bile duct leak	6
B		Occluded right posterior sectoral duct	-
C		Leak from right posterior sectoral duct	1
D		Lateral injury to extra-hepatic duct	6
E1		Transection with stricture >2cm from hilum	6
E2		Transection with stricture <2cm from hilum	8
E3		Hilar stricture with right and lefts ducts in continuity	7
E4		Hilar stricture with separation of right and left ducts	1
E5		Stricture of main bile duct and right posterior sectoral duct	-

There were 32 injuries referred to this unit during a previous 7-year study period (1992-1998)[5]. Considering the steadily increasing number of cholecystectomies rate over the last decade, this may suggest that the overall biliary complication rate has reduced. However a direct comparison of incidence could not be made due to incomplete cholecystectomy data for the previous period.

It has been reported that only 25-32.4% of bile duct injuries are recognised at the index surgery[2]. Our data is consistent with this but, significantly, only 26% of injuries were recognised at cholecystectomy compared with 41% in the previous series. Of the more severe Type D and E injuries, only 1 (17%) and 8 (36%) were recognised respectively which again is less than previously (78% and 50% respectively). Only 14 (40%) injuries were referred immediately. Twelve (37%) were 'early' and 8 (23%) 'late' referrals. The decreased recognition rate may have implications regarding timeliness of referral and therefore outcome. It is well recognised that immediate recognition, hepatobiliary referral and repair are associated with improved outcomes[1,2,6].

Biliary complications range from minor ductal leaks, often managed non-operatively, to proximal transectional injuries requiring major biliary and occasionally vascular reconstruction. Several classification methods have been proposed but the Strasberg method remains the most commonly used[1,2,6,7]. Type E injuries involve the common hepatic/bile duct and are considered more severe, usually necessitating hepaticojejunostomy with increased morbidity

and mortality. There were 22 Type E injuries during this study period compared with 10 between 1992-1998. Furthermore, there were 8 severe proximal injuries (Type E3/E4) involving the hilar confluence and 4 injuries involving transection of the right hepatic artery[8]. Concomitant right hepatic artery injury occurs more often with severe proximal biliary injury and is associated with increased morbidity including hepatic ischaemia and right hemihepatectomy[9].

Only 3 patients (9%) were managed without open surgery. Of 11 patients who had a laparotomy prior to referral, 7 required a further open procedure including 1 patient who had revision of a hepaticojejunostomy. Twenty-one (95%) of the Type E injuries required hepaticojejunostomy, one of whom later developed hepatic necrosis necessitating a right hepatectomy. All are committed to a minimum of 10 years of follow-up to exclude late stricturing and cirrhosis[10,11]. This emphasises the considerable morbidity associated with bile duct injury. There were no mortalities in this series.

Bile duct injury should be regarded as preventable. The commonest cause of injury is mis-identification of biliary anatomy. Preventative techniques include correct anatomical orientation with dissection lateral to the 'line of safety', identification of the 'safety zone', 'critical view of safety', and cross-checking[3,12-14].

If dissection and orientation are difficult, early open conversion is recommended though it is worth noting that there were 3 open injuries in this series – one of which occurred after conversion. If excessive inflammation and fusion of the tissue planes are encountered, safety strategies such as partial cholecystectomy or cholecystostomy should be utilised.

Patients presenting in the early post-cholecystectomy period with biliary leak, peritonitis and/or jaundice should be considered to have sustained a biliary injury. Delay in diagnosis is associated with increased morbidity. Once diagnosed, resuscitation, external drainage and control of sepsis should be established. The patient should be immediately referred to a hepatobiliary surgeon for further management as early repair is associated with lower morbidity and mortality, shorter duration of treatment and improved quality of life[15-18]. Inadequate and delayed management may lead to severe complications including sespis and multi-organ failure in the acute phase or late biliary stricture and cirrhosis.

CONCLUSION

The incidence of biliary injury following laparoscopic cholecystectomy in Northern Ireland over the last 11 years was low – 0.2%. However, there were delays in the recognition and referral of most injuries and the majority required further operative management. Careful anatomical orientation, cross-checking and dissection are recommended to prevent such injuries. Prompt hepatobiliary referral should be sought upon recognition.

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Paper

Evaluation of a Final Year Work-shadowing Attachment

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ABSTRACT

The transition from medical student to junior doctor is well recognised to be a difficult and stressful period. To ease this transition, most UK universities have a work-shadowing period (WSP), during which students can learn practical skills needed for forthcoming employment. The aim of this study was to evaluate the WSP at Queen's University Belfast, and gain the views of both students and Foundation Programme Supervisors and Directors (FPSDs). The study utilised both qualitative (focus groups) and quantitative (questionnaires) approaches. The FPSDs completed a specific questionnaire designed for this study, while the students completed the university's internal quality assurance questionnaire. Twenty-eight of the 37 (76%) FPSDs and 106 / 196 (54%) students completed the questionnaires. Focus groups were conducted with up to 10 students in each group in both a regional centre and a district general hospital at the start and the end of the WSP as well as 8 weeks into working life. The transcripts of the focus groups were analysed and themes identified. A number of deficiencies with the current WSP were identified, including concerns about the use of log books, the timing of the attachment and relatively low levels of supervision provided by senior hospital staff members. As a result, students felt unprepared for commencing work, with particular mention given to medical emergencies, prescribing, and the emotional aspects of the job. A number of recommendations are made, including the need for more senior input to ensure better student attendance, participation and clinical interaction. Furthermore, students should be offered additional supervised responsibility for delivery of patient care and more experiential learning with respect to drug prescribing and administration. The study also suggests that more needs to be done to help ease the emotional and psychological stresses of the early FY1 period. These issues have been resolved to a large extent with the introduction of the new final year Student Assistantship module in the academic year 2010-2011.

August	Clinical elective (6 weeks)
September	
October	Preparation for practice. Clinical Rotations in Medicine, Surgery, Specialties (9weeks)
November	
December	
January	Part : written examinations
February	Clinical Rotations in Medicine, Surgery, Specialties (9weeks)
March	
April	Part 2 clinical examinations
May	Work shadowing (4 weeks)
June	
July	Graduations
August	Hospital Trust Induction

Fig 1. Structure of Final Year.

INTRODUCTION

One of the major aims of medical school is to lay the educational foundations for a lifelong career and equip junior doctors for the first stage in their working lives[1]. However, concern exists that the transition from student to doctor is too abrupt and, thus, is a cause of great stress[2, 3]. In order to help bridge this gap, most medical schools in the United Kingdom (UK) incorporate a work-shadowing period (WSP), when final year students can spend time with existing junior doctors[4]. However, there is no set defined duration or timing for the period and, as such, it varies across medical schools.

New graduates have reported that they feel under-prepared and inadequately equipped for work life[5], and this has resulted in some medical students requesting further training[6]. As such, there remains a significant gap between undergraduate training and what is required of the newly qualified doctor[2]. Nonetheless, despite the obvious importance attached to this period of training, there has been concern about student engagement with work-shadowing attachments[7]. The importance of work-shadowing and student assistantships are highlighted in the latest edition of Tomorrow's Doctors[8].

The aim of this study was to evaluate the work-shadowing attachment at Queen's University Belfast (QUB) by gaining the views of both Foundation Programme Supervisors and Directors (FPSDs) and final year students at the time of their transition to the Foundation Programme.

METHODS

Approval for the study was obtained from the Research Ethics Committee of the School of Medicine, Dentistry and Biomedical Sciences, QUB.

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At QUB, all final year students complete a 4-week work-shadowing attachment during the month of May and after completion of the final year clinical examinations (Figure 1). During this time, students are generally assigned to the hospital where they will be employed as FY1 trainees and are expected to 'shadow' the existing FY1 trainees in order to gain the necessary experience to ease the transition from medical student to practising doctor. The students are assessed by means of a logbook, which contains a range of clinically relevant tasks and procedures commonly undertaken by FY1 trainees.

This study utilised both qualitative (focus groups) and quantitative (questionnaires) methodologies and was carried out during the academic year 2007-2008. Two questionnaires were used in this study. The first was the standard QUB WSP evaluation questionnaire, which was issued to all students at the end of the attachment. The second was sent to all FPSDs who were working in the hospitals in Northern Ireland on behalf of the Northern Ireland Medical and Dental Training Agency. Both questionnaires utilised a Likert scale, ranging from 'strongly agree' to 'strongly disagree', as well as open-ended questions.

Focus group sessions with the medical students / trainees were undertaken on three occasions: at the start of the WSP, at the end of the WSP and then eight weeks into the FY1 year. Two groups of selected trainees (n=10), who were assigned either to a district general hospital or a large teaching hospital, agreed to participate. In total, therefore, there were six focus groups. Each focus group discussion was recorded and transcribed. These transcripts were then screened to assess for trends and themes, which were believed to be representative of the sample populations. This was achieved with the help of a qualitative data analysis software programme (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 8, 2008), which helped to identify trends and code passages of the transcript into different categories.

RESULTS

Foundation Programme Supervisors and Directors' (FPSD) questionnaire

Twenty-eight of the thirty-seven (76%) FPSDs replied to the questionnaire. The responses to the Likert scale questions are summarised in Tables 1a and 1b. Table 1a contains the questions that dealt specifically with the students - there was strong agreement that the WSP benefited the students in terms of skills and helped them to acclimatise to working life. Data relating to wider issues, including assessment, hospital Trust responsibility, and timing of the attachment and induction, are summarised in Table 1b. Overall, there were strong beliefs expressed that the logbook was not an acceptable form of assessment.

The views of the FPSDs were also sought on several issues, including student attendance and the use of logbooks, using open-ended questions. The respondents recognised that

Table 1a.

Results obtained from the FPSDs questionnaire from questions specifically about the students.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Students find the work shadowing period a useful experience	39.3% (11)	50.0% (14)	10.7% (3)	0.0% (0)	0.0% (0)
Students need the work shadowing period to acclimatise to the work environment	71.4% (20)	21.4% (6)	3.6% (1)	3.6% (1)	0.0% (0)
Students make the most of the work shadowing period	17.9% (5)	28.6% (8)	28.6% (8)	25.0% (7)	0.0% (0)
Students should be employed and paid for the work shadowing period	10.7% (3)	3.6% (1)	25.0% (7)	35.7% (10)	25.0% (7)
During the work shadowing period students integrate into the ward	28.6% (8)	32.1% (9)	28.6% (8)	10.7% (3)	0.0% (0)
Student attendance is good during the work shadowing period	28.6% (8)	53.6% (15)	14.3% (4)	3.6% (1)	0.0% (0)
The learning outcomes for the work shadowing period are usually met by all students	14.3% (4)	42.9% (12)	39.3% (11)	0.0% (0)	3.6% (1)
During the work shadowing period students improve their communication skills	17.9% (5)	21.4% (6)	46.4% (13)	14.3% (4)	0.0% (0)
During the work shadowing period students improve their clinical skills	21.4% (6)	35.7% (10)	32.1% (9)	10.7% (3)	0.0% (0)
During the work shadowing period students improve their practical skills	21.4% (6)	53.6% (15)	17.9% (5)	7.1% (2)	0.0% (0)
Students deserve a 'relaxed' period so soon after the final MB examinations	3.6% (1)	21.4% (6)	25.0% (7)	46.4% (13)	3.6% (1)

Table 1b.

Results obtained from the FPSDs questionnaire from questions about assessments, trust responsibility, timing of the attachment and induction.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are no problems with the current work shadowing period system	10.7% (3)	21.4% (6)	32.1% (9)	32.1% (9)	3.6% (1)
The timing of the work shadowing period is appropriate	14.3% (4)	71.4% (20)	3.6% (1)	7.1% (2)	3.6% (1)
During the work shadowing period, the students should no longer be the responsibility of the university and should now be accountable to the health trust / hospital	7.1% (2)	14.3% (4)	7.1% (2)	46.4% (13)	25.0% (7)
The work shadowing period should occur simultaneously with the hospital induction	21.4% (6)	10.7% (3)	14.3% (4)	35.7% (10)	17.9% (5)
Adequate supervision is given to students during the work shadowing period	10.7% (3)	46.4% (13)	25.0% (7)	14.3% (4)	3.6% (1)
The duration of the work shadowing period is appropriate	10.7% (3)	60.7% (17)	21.4% (6)	7.1% (2)	0.0% (0)
The log book adequately evaluates the student's performance during the work shadowing period	3.6% (1)	17.9% (5)	39.3% (11)	39.3% (11)	0.0% (0)
Once the log book is completed students have shown the competencies needed to be an F1 doctor	3.6% (1)	7.1% (2)	17.9% (5)	60.7% (17)	10.7% (3)
The log book is the best way to formally assess students during the work shadowing period	3.6% (1)	14.3% (4)	32.1% (9)	50.0% (14)	0.0% (0)
The log book alters the focus of the students from learning to gaining signatures	14.3% (4)	60.7% (17)	14.3% (4)	10.7% (3)	0.0% (0)
The signatures in the log book gained by the students indicate that the students have genuinely completed/ performed the task which has been signed off	7.1% (2)	14.3% (4)	35.7% (10)	42.9% (12)	0.0% (0)
The completion of a log book could occur in significantly less time than the actual work shadowing period	3.6% (1)	57.1% (16)	21.4% (6)	17.9% (5)	0.0% (0)

student attendance was variable, in part due to the timing of the attachment. Some FPSDs felt that the WSP should be undertaken just prior to commencement of employment, and they emphasised the importance of student integration into the workplace-based clinical teams. Whilst some FPSDs felt that the logbooks encouraged students to document events and recognise learning outcomes, many felt that the logbooks did not accurately mirror the work that the students had completed, as the logbooks did not take account of the number of tasks or, indeed, the quality of the work performed. Some FPSDs believed that obtaining signatures in the logbook, rather than acquiring competence in the necessary skills, became the students' focus. Alternatives, including use of workplace-based assessments, were suggested by some of the FPSDs.

Students' Questionnaire

There were 106 (54%) questionnaires returned by the 196 students who completed the WSP in May 2008. The results are summarised in Table 2. Overall, the students reported that they found it a useful experience and that supervision was acceptable for ward-based tasks.

Results from the focus groups

The six transcripts were analysed and the following themes emerged.

1. What students expected to gain from their WSP and what they actually gained

In the first set of focus groups, the participants' ideas about what they expected to achieve from the attachment focused mainly on gaining confidence and skills in procedures. Most students, however, were not so confident that the completion of the work-shadowing objectives would make them ready for commencing work as a FY1 in August. In the second set of focus groups there were mixed reactions from the students about how prepared they were for work following the WSP. Most students enjoyed the attachment, and recognised that they were better prepared for starting work as a result of it, but

overall still felt nervous about the prospect of starting working in August. In the third set of focus groups most respondents believed that there had still been too big a bridge between being a student and working life.

2. Discussion around attendance and timing of the WSP

At the first focus group students showed optimism regarding their potential attendance during the forthcoming WSP. They appeared keen to engage with the learning opportunities on offer, and seemed to view it as a way of easing fears about their future employment. However, a minority of the students seemed not so keen to attend, foreseeing the closeness of the WSP to their recent final examinations and the lack of examination results as potential mental barriers. In the second focus group the students admitted that attendance was incomplete, particularly during the final two weeks. In the third focus group the trainees felt that it would have been more beneficial if they had been encouraged to participate in more 'out-of-hours' work. Students also suggested that the current system could be improved by having a shorter and more intense WSP, which was closer to the actual date of commencing work, with more consultant input and more responsibility for patient care.

3. Logbooks

Most students did not value the use of the logbooks, stating that having to complete the book highlighted the fact that they were still students and, as such, it was demotivating. Also despite full attendance and hard work, a student could still have an incomplete log book, giving the impression of poor attendance or, indeed, lack of effort. Alternative suggestions to the log books included having consultants giving a pass/fail mark or shadowing the FY1 all day and then completing a diary which the FY1 could sign off at the end of each day.

4. Interaction with staff

The students were generally happy with the interaction with the ward staff. In particular, the FY1 trainees and nursing staff were regarded as very helpful. The students were satisfied with the supervision at ward level when performing individual tasks. However, they felt that, due to limited senior doctor input at ward level, there was a lack of direction about their role on the ward.

5. Other Issues

Several students felt that the WSP did not help them to deal with the emotional aspects of the job, although they seemed to accept that this was something that could be learned through working on the job. A further problem mentioned by the students was the lack of experience in drug prescribing.

DISCUSSION

This study has highlighted a number of themes in relation to work-shadowing, both of a positive and negative nature.

Preparation

The importance of the WSP, in relation to acclimatisation to the work environment and improving students' skills, was stressed by both the students and the FPSDs. The focus groups highlighted some specific areas in which the students did not feel prepared, which is in keeping with previous work[1,2]. Management of emergencies was one such situation and previous work has reported that increased exposure to emergencies in undergraduate years could reduce such apprehension[9].

Several students also felt that they were not emotionally well enough prepared for many aspects of the job. Emotional distress in the transition period is associated with higher levels of depression and anxiety[3] and personal life problems[10]. Consequently, it is important that medical schools recognise the emotional problems associated with starting life as a junior doctor and attempt to address these issues.

A further concern raised by the students was their perceived lack of responsibility for patient management, despite reported benefits from student involvement in patients' care[11]. This lack of accountability to the patients further inhibited the students' attendance and participation by creating a mentality of 'if I am not involved I will not be missed.' Furthermore, students with reduced responsibility and accountability are more prone to unprofessionalism and medical error and, as such, it is important that medical students are accepted as junior colleagues and are given some responsibilities, albeit recognising that patient safety is paramount[8,12].

A lack of confidence in drug prescribing was mentioned by the students. Every day in a 'typical' NHS hospital approximately 7,000 individual drug doses are administered, of which 70% are prescribed by first year graduates and senior house officers, despite having little experience of such responsibility prior to graduation[13]. Furthermore, less than a third of recent graduates felt adequately prepared to prescribe, with many others feeling insecure in providing enough information about treatments to guide patients to make informed decisions[14]. Illing and colleagues[15], in their review of how well prepared medical graduates are to practise, highlighted that there were gaps in their knowledge in relation to prescribing and calculating dosage, and indeed, pharmacology in general.

Attendance and supervision

Most students reported that they had received adequate supervision when performing practical procedures and common administrative ward tasks. The importance of appropriate supervision is not only beneficial for the students' learning and comfort, but can have positive effects on patient outcome[16]. However, the focus groups provided more in-depth analysis, with students stating that they would have appreciated more consultant input. The effectiveness of clinical teachers is related to their skills and knowledge[17]. Interestingly only 57 per cent of FPSDs agreed that adequate supervision was given to students during the work shadowing period. However, the students in this study are not alone in requesting more senior input, with house officers, senior house officers and registrars expressing similar views[18,19]. The students in the focus groups cited the lack of senior input as having a negative effect on attendance. Indeed, students are often demotivated by the perception that seniors have a low level of commitment to supervision[20]. The main complaint from the focus groups in relation to supervision seemed to be the lack of direction in terms of whom to shadow. The implementation of the European Working Time Directive has led to the development of complex rotas for junior doctors and introduction of 'Hospital at Night' teams. Assignment

Table 2.

Results of the Students' Questionnaire.

	Strongly Agree	Agreed	No strong views	Disagree	Strongly Disagree
I found the workshadowing a useful experience.	39%	58%	2%	1%	0%
The programme was well organised.	22%	58%	15%	5%	0%
I was allowed to undertake common administrative ward tasks under supervision.	39%	60%	0%	1%	0%
I was able to understand the documentation of patient records and hospital request forms.	37%	62%	1%	0%	0%
I was able to improve my communication skills within the hospital environment.	27%	58%	15%	0%	0%
I was able to undertake commonly performed practical procedures under supervision.	36%	62%	1%	1%	0%
I was able to keep an accurate log of the tasks and practical procedures undertaken.	29%	64%	7%	0%	0%
I was able to practice my clinical skills and gain clinical experience.	31%	58%	8%	3%	0%
There was sufficient time available to complete the programme.	39%	56%	4%	1%	0%
I completed all the tasks commonly performed by an F1 doctor.	27%	59%	9%	3%	2%
I found the ward staff co-operative while I was completing this programme.	39%	57%	4%	0%	0%
The learning outcomes were stated clearly.	28%	60%	8%	4%	0%
The learning outcomes were met.	26%	66%	8%	0%	0%

to these teams may facilitate more active participation by the work-shadowing students and more access to management of emergency situations.

Timing and duration of attachment

The FPSDs were in general agreement that the timing was appropriate. However, the focus group participants had different opinions, citing that they were distracted by just finishing examinations and not having the results, making it difficult for them to put the importance of the attachment into context. The students thought that the optimal timing for the attachment was just before starting work, as they believed this would promote greater retention of knowledge and attendance. However, it is important to recognise that at this stage the students would have already graduated from the university. In addition, with the current system, if a student has not successfully completed the WSP in May, he/she has an opportunity to undertake a further attachment during the month of June.

The students were specifically asked in the focus groups what they thought about the duration of the attachment and most expressed the view that it was too long. This is in direct contrast to the views of the majority of FPSDs who believed that the duration of the attachment was appropriate.

Logbooks

The evidence obtained from this study suggests that both the students and the FPSDs feel that the logbook has major flaws. A supervisor's signature in the logbook may not be an accurate reflection of a student's competency in that task[21]. It has been suggested that the completion of logbooks does not impact on learning as it may encourage students to do what is necessary to complete their training rather than collecting information in a way that might be useful for their future career[22]. As such, it is unrealistic to accept the conventional **logbook** as the principal and only measure of procedural experience or competence[23].

Tomorrow's Doctors 2009

Recently, a further edition of the GMC's Tomorrow's Doctors has been published[8]. This highlights the need for medical students to have more opportunities to gain knowledge and skills with patients in clinical placements, and encourages the development of Student Assistantships in the final year, in which "a student, assisting a junior doctor and under supervision, undertakes most of the duties of an FY1 doctor." Assistantships should be above and separate to the WSP, which is when the student spends "a period working with the FY1 who is in the post they will take up when they graduate."

The WSP should also consist of 'protected time' distinct from induction. The document also states that the WSP should normally last at least one week and take place as close to the point of employment as possible. In May 2011, Queen's University replaced the final year WSP with a novel Student Assistantship and many of the issues identified in our WSP study have now been addressed. An evaluation of that Student Assistantship is planned.

CONCLUSIONS

This study has highlighted a number of deficiencies with the current WSP, including the focus on the use of log books, the timing of the attachment, relatively low levels of supervision provided by senior hospital staff members, and students feeling particularly unprepared for medical emergencies, prescribing, and the emotional aspects of the job. The majority of FPSDs shared views with the students on the usefulness of the attachment, the limitations of the logbooks, that not having exam results served as an obstacle to the students' involvement, and that students' skills improve during the attachment. However, there were clear disagreements between the students and FPSDs on the timing and duration of the attachment, and about student attendance.

To help ease the transition to working life students should have clearer directions about whom to shadow and have the opportunity to work with the 'Hospital at Night' team. Currently, as part of the Student Assistantship, work is underway to introduce workplace-based assessments similar to those used by doctors-in-training. These should supersede the log book as the formal assessment and could also help condition the students for post-graduate training. Use of simulated training environments would allow students to gain experience about medical emergencies, and drug prescribing and administration in a safe environment. QUB's introduction of a longer student assistantship for the 2012 graduates should help ease students' worry about the duration of attachment. Finally, further study is also needed to assess the extent of the emotional and psychological impacts of the early FY1 period, as well as mechanisms to ease this transition.

The authors have no conflict of Interest.

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Case Report

Iatrogenic extreme corneal decompensation treated by sequential Descemet's Stripping Endothelial Keratoplasty surgeries six months apart

Gwyn Samuel Williams, Mohammed Muhtaseb

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ABSTRACT

Descemet's stripping endothelial keratoplasty (DSEK) is now the most common surgical procedure to treat endothelial dysfunction although it is known that endothelial cell survival is an issue of concern. We present a case whereby severe iatrogenic corneal decompensation caused by Descemet's membrane detachment following premature disconnection of an infusion tube at the end of a trans pars plana vitrectomy and epiretinal membrane peel was successfully treated with two staged DSEK procedures six months apart. The patient was counselled that due to the severity of his extreme corneal oedema more than one DSEK procedure may be needed and the procedure was planned from the outset as a two-stage procedure. There was a measurable decrease in corneal thickness and increase in visual acuity following both the first and second procedures, which may be due to reinvigoration of the endothelial cell count following each procedure. We suggest that repeating the DSEK procedure, even when the first operation has gone well and the graft appears healthy, may be beneficial in obtaining further improvement in cases of severe corneal oedema.

INTRODUCTION

The human cornea consists of three main histological layers; the inner endothelium, the outer epithelium, and the stroma sandwiched between the two. The stroma contains numerous glycosaminoglycans as well as proteoglycans, all of which have a strong osmotic pull and as the clarity of the cornea is dependent of keeping water away from these structures the endothelium has to constantly pump fluid out of the stoma in order to avoid corneal swelling, opacification, breakdown of the overlying epithelium and a blurring of the vision that results from all of these effects. Indeed these are the main signs of corneal decompensation due to endothelial failure.

Descemet's Stripping Endothelial Keratoplasty (DSEK), in which the patient's diseased endothelium is replaced with that of a donor, has become the treatment of choice for endothelial dysfunction and has now become the commonest operation performed in America for this purpose, being performed in 86% of patients with Fuchs' dystrophy, which is the commonest form of endothelial dystrophy[1, 2]. An area of concern with DSEK, as with the preceding treatment of penetrating keratoplasty (PK)[3], in which all three layers of the cornea are replaced, is that endothelial cell survival in the donor tissue is impaired compared with endothelial cells in the normal eye, and can lead to graft failure in up to 3.6% of patients within 5 years[4]. Indeed, the median 5 year endothelial cell loss rate was found to be 53%[4], with 6 month and one year cell loss rates being greater than those seen with PK[2]. It is thought that increased manipulation of the endothelium may the reason behind this.

From this data it can be argued that extreme corneal decompensation would possibly best be served by performing a PK, with all the attendant slower recovery and more unpredictable result[5, 6]. We present a case whereby severe corneal decompensation caused by iatrogenically induced Descemet membrane detachment was treated by sequential planned DSEK operations, which we believe to be the first time this has been described in the literature.

CASE REPORT

An 82 year old patient undergoing a trans pars plana vitrectomy and epiretinal membrane peel of the left eye suffered collapse of the eyeball after an infusion line was prematurely cut. On the first post-operative day, severe corneal oedema was noted with a superior Descemet's detachment that had reduced his vision to hand movements from his pre-operative visual acuity of 0.48 LogMAR. On the LogMAR system of visual acuity measurement 0.00 is equal to 6/6 Snellen and 1.00 is equal to 6/60. Pachymetry, a measurement of the thickness of the cornea, measured 1148microns. The average value for corneal pachymetry is 555microns.

After monitoring the patient for three months, during which time no surgical treatment took place, the patient was referred to the corneal clinic where he was counselled that due to the severity of his corneal oedema more than one DSEK procedure may be needed. The first procedure was successfully carried out under a general anaesthetic a month later. This consisted of preparing the donor material on a Katena artificial anterior chamber with an 8.5mm trephine followed by host preparation including removal of

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what remained of the Descemet's membrane. The donor endothelium was mounted on a Busin glide and presented at the inferior incision, pulled to the correct position, centralised and the anterior chamber filled with air. Post operative recovery was uneventful on the usual regime of topical dexamethasone.

After the first DSEK procedure corneal pachymetry revealed improvement in thickness from 1145 microns to 995 microns, the unaffected right eye being 584 microns, with the patient noticing a marked improvement in vision, although objectively this amounted to counting fingers. There were no infections, graft dehiscence or significant change in intraocular pressure noted in the postoperative period. After six months he was seen to be showing only minimal signs of corneal thinning compared to the earlier post-operative period and it was clear that further improvement was very unlikely to occur. Therefore a second DSEK procedure was performed. At this procedure the previously transplanted endothelium was removed with a Reverse Sinskey Hook and a fresh donor Descemet's membrane placed.

This too was a successful operation in which no complications occurred and at three months postoperatively the vision in the left eye was much improved. The vision was noted at 0.80 LogMAR, improving to 0.70 with a pin hole (though no formal refraction was performed), with corneal pachymetry demonstrating thickness of 689microns in the left eye. At six months postoperatively the visual acuity remains stable at 0.78LogMAR, improving to 0.70 with a pin hole, with the pachymetry remaining stable at 681microns. A slight corneal haze persists but centrally the cornea was clear.

DISCUSSION

Here we present the case of a patient with very severe corneal decompensation who obtained some degree of improvement in corneal thickness following primary DSEK but then went on to further improve following repeat DSEK surgery. While it is known that endothelial survival rates are lower at both six months and one year after DSEK compared with after PK[3] and that endothelial failure is one of the primary causes of graft failure with this mode of treatment[5] the role of planned sequential DSEK's has not been previously explored.

Repeat DSEK surgery has been described by many authors, with one series examining the commonest reasons for this concluding that 24% of these were due to endothelial failure alone. [6] Other surgeons have quoted higher failure rates due to endothelial failure, but of note is that even among clear grafts the endothelial cell count was noted to have fallen quite significantly, being 1078+/- 507 cells/mm^2 at one year follow up in one series[7]. Both corneal oedema and corneal thickness have been noted to improve following DSEK up to three months postoperatively before stabilising[8] and it is possible that this is due to the rapid decline recorded in endothelial cells in the first few months following the procedure.

The vast majority of repeat DSEK operations have been undertaken because of endothelial graft failure[6] but there have been a few described cases of graft exchange where problems with the graft interface were thought to be responsible for the suboptimal visual acuity, though endothelial counts were not explored[9, 10]. To our knowledge there have been no previously published reports of a second DSEK operation being performed in the presence of a functioning graft for the purpose of reinvigorating the endothelial cell count in a severely oedematous cornea.

There were no complications following the first DSEK procedure carried out on our patient with no graft detachment, which is the main factor associated with declining endothelial counts and graft failure[7], with no other intraoperative or postoperative complications being noted either. It is of great regret that the exact endothelial cell count could not be obtained due to a lack of equipment at our hospital but based of these deductions there is no reason to suppose any unusual or unexpected cause of endothelial cell death was at play. Our deduction in presenting this case is that severely oedematous corneas may need more time to clear than the window offered by one DSEK procedure alone and so a repeat DSEK may be a viable option in obtaining further resolution of oedema. It is acknowledged however that more work needs to be done in this area before a more concrete recommendation is made, with emphasis placed on obtaining clear endothelial cell counts at each stage in the two stage 'double-DSEK' procedure in order to form a more conclusive view of what processes are at play.

The authors have no conflict of interest.

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Medical History

Three Ulster Surgical Gentlemen

David Macafee

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Fig 1. Alastair L Macafee

Fig 2. CG Lowry ("CG") Portrait painting by Sir James Gunn 1945

Fig 3. CHG Macafee ("Mac")

This article briefly describes the professional lives of three Ulster surgeons. Alastair Macafee was a consultant Orthopaedic Surgeon at the Ulster, Musgrave Park and Ards Hospitals for many years (Figure 1). His grandfather CG Lowry and father CHG Macafee were Professors of Midwifery and Gynaecology in Belfast spanning 43 years from 1920 to 1963 (Figures 2 and 3). This article provides a snapshot of their surgical contributions to medicine and provides some historical references which remain relevant to our profession today.

CHARLES GIBSON LOWRY – "CG"

Charles Gibson Lowry, "CG" for most of his professional life, was the eldest son of a Limavady farmer. Once qualified, CG started in General Practice but later decided to forge a surgical career, and was appointed Assistant Gynaecologist at the Ulster Hospital for Children and Women in 1908.

During the 1914-18 war he looked after some of the casualties returning from France and trained in the "no touch" surgical technique in Liverpool under Sir Robert Jones (1858-1933), one of the early pioneering Orthopaedic Surgeons. This experience fueled his determination to obtain the FRCS, achieving top marks in the FRCS exam in 1918, despite a busy consultant practice. CG would regularly return to Liverpool to learn the art of gynaecology from Blair Bell who was one of the doyens of gynaecology at the time, and in 1920 he was appointed Professor of Midwifery at Queen's University. His main contributions from this point were fourfold: marked reductions in maternal mortality rates, the training of doctors and nurses in the art of obstetrics, the building of the Royal Maternity Hospital in Belfast and being one of the founders of the Royal College of Obstetricians and Gynaecologists in London (RCOG)[1].

THE ORIGINS OF THE ROYAL MATERNITY HOSPITAL, BELFAST ("RMH")

Unacceptably high maternal and fetal mortality rates were causing great concern in the early 1920's at the maternity hospital in Townsend Street (Table 1). The maternal mortality rate in 1925 was 4.4 per 1000; 150 women per year died in pregnancy and childbirth which represented three women a week and one tenth of all deaths in women between ages 20 and 45 years[2].

Antepartum haemorrhage ranked fourth as a cause of maternal mortality and to tackle this and other maternal issues, CG and Dr Tommy Holmes commenced Antenatal Clinics, and appointed CHG Macafee as tutor. In the first nine months,

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the maternal death rate from placenta previa fell to12% and in the next three months, 6%. By 1944, it would be 0.57 %.

Table 1:

Maternal death rates in Northern Ireland

Macafee CHG. The history of the chair of Midwifery and Gynaecology in the Queen's University of Belfast 1835-1945. Ulster Medical Journal 1975;44:93-115.

Year	Mortality (%)
1922	14.4
1923	18.7
1924	12.1
1925	6.0
1926	1.1

This improvement further stimulated CG to try and improve the education of health professionals and the environment for expectant mothers. He increasingly recognised that having the care of women disparate from other specialities was unwise. To save lives, you had to have all the available specialties close at hand. His vision was a Maternity Hospital on the Royal Victoria site. Additionally, medical students were at that time traveling to the Rotunda Hospital in Dublin to get their obstetric experience – whether he wished to ensure education in house or to reduce the well recorded Guinness excesses is unclear. He was not "easy" on his students and demanded the highest qualities from them. Table 2 lists some of his classic comments.

Table 2:

Advice to students from CG Lowry

- Men make mistakes not because they don't know but because they don't look
- A sound knowledge of medicine and avoidance of a narrow focussed approach to any specialty
- An MD is a check on idle habits
- The young man who has the goods will always get a market for them. Some men will find their markets sooner than others but the man who has the goods to sell cannot be kept indefinitely in the shade

To succeed in his vision of a new maternity hospital, he required land, political support, money and the backing of his consultant colleagues. The Belfast Corporation allocated a free site of five acres near the Royal Victoria Hospital which solved one problem.

Lord Dufferin (b 06/04/1909 d 25/03/1945), the 4th Marquess and speaker of the Northern Ireland Senate, before a trip to Canada asked CG where to visit to see the best maternity care. CG, following his own visit to North America in 1926 recommended Toronto. On their return a journalist asked Lord Dufferin for a comment on his trip. "Belfast should be ashamed of its City Hall, he said". When the astonished reporter enquired why, Lord Dufferin replied "A city which has a maternity hospital like Townsend Street should be ashamed of such a wonderful City Hall",;[2].

The path to integrating maternity services into hospital care did not run smoothly however. In 1927, senior physicians dismissed the matter of amalgamation by postponing the decision for a further year. CG reportedly responded privately by saying: "I always knew that physicians were only interested in Obstetricians when their wives were having babies, now they are all past that ……"[2]. Of note however was the continued support of the Professor of Medicine, Professor James Lindsay.

In the Appeal for money to fund the Maternity Hospital, CG made a presentation in the City Hall and, having enunciated all the reasons, he made these three significant statements:

- "The success of all great causes requires money and an enlightened public opinion."
- "A hospital is a hospice for those who need help and secondly a centre for education."
- "I can imagine no better memorial to a mother than a good Maternity Hospital."

The Royal Maternity Hospital (RMH) finally opened in 1933 and this plaque in recognition of his efforts still stands there today (Figure 4).

Fig 4. Memorial to CG Lowry, Royal Maternity Hospital, Belfast

THE ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS ("RCOG")

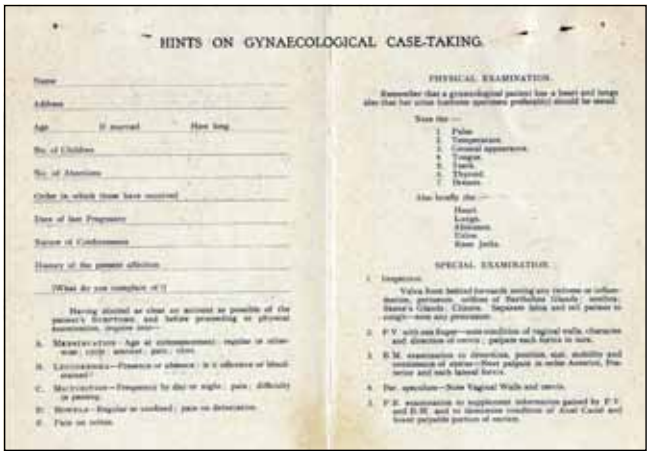
His association with Blair Bell (1871-1936) helped in the formation of the Royal College of Obstetricians and Gynaecologists (RCOG) in 1929. They believed that only by having a college devoted entirely to the practitioners of their art, could any general raising of standards be achieved. His was one of the nine signatures to the document submitted to the Board of Trade. CG would subsequently become a Vice-President.

Other activities outside of Ulster included eight years as the Crown nominee for Northern Ireland on the General Medical Council. He was an external examiner at the University of Glasgow and an honorary president of that city's Obstetrical

and Gynaecological Society[3]. He also gave a Presidential address to the Ulster Medical Society on "The problem of uterine cancer" in 1933[4].

TABLE 3:

CG Lowry Hints on Gynaecological Case-Taking



HINTS ON GYNAECOLOGICAL CASE-TAKING

Despite all these other activities, he remained a prolific and renowned teacher of the art of obstetrics till his retirement. He ensured there was a lecture theatre in the RMH so that trainees could still attend teaching despite being on labour suite. He published "Hints on Gynaecological case-taking" which were given to local GPs and to students (Table 3). Figure 5 is taken on his last day pre retirement, in theatre in 1945. His obituary, written by a General Practitioner (Dr Hall Stewart), reaffirmed that he brought a sense of security and courage when dealing with clinical and professional challenges while administering firm rebukes if circumstances demanded it or work was substandard. He had few equals as a teacher and his many aphorism remained with those he trained throughout their careers. He had " the gift of imparting knowledge in a simple way, and was ever ready to help any student or young doctor who was willing to work"[4]. His recognition and understanding of a patients perspective and "his outstanding ability as a surgeon, combined to make him the ideal consultant that he was acknowledged to be"[4].

Fig 5. CG Lowry after his last operating list pre retirement in 1945

CHARLES HORNER GREER MACAFEE ("MAC")

CHG Macafee, a son of the manse, graduated from Queens with first class honours in 1921, obtained the FRCS in Dublin and London and was appointed to the chair in Midwifery in 1945, holding it for 18 years. Figure 6 shows the two men joining an esteemed gathering of the Gynaecological Visiting Society at Oxford in 1945.

Fig 6. Gynaecological Visiting Society of the Royal College of Obstetricians and Gynaecologists, Oxford 1945

Back Row: *Unknown*, Alan Brews (*Spectacles*) , Arthur Bell, Joe Wrigley.

Middle Row. From left: Eardley Holland, Bethel Solomons, Dan Dougal, *Unknown*, Roques, Gibberd (*spectacles*), Strachan, Gemmell, R.W.Johnstone, Gilliatt, Claye, Charles Macafee ("MAC"), Fahmy,Uknown.

Front Row: Charles (CG) Lowry, Munro Kerr, Miles Phillips, Comyns Berkeley, Chassar Moir, Gough, Farquhar Murray, James Young, Fletcher Shaw.

Professionally known as "Mac" through his career, CHG's contributions to medicine included introducing expectant management for placenta previa (in which he became the world expert) which helped in reducing maternal mortality in Belfast and providing a specialist practice for radical resection of vulval cancer[5]. He also published papers on ovarian tumours and intestinal endometriosis[6-8]. He became Vice President of the RCOG, was awarded a CBE, an Honorary DSc from the University of Leeds and later became the Queens' Deputy Lieutenant for the County of Down. He married CG's daughter, Margaret Crymble Lowry and had three children: CA Jeremy Macafee (FRCS, FRCOG), Alastair Lowry Macafee (FRCS) and Anne G Macafee (RCN; later Mahood).

PLACENTA PREVIA

In 1937, the three obstetricians at the RMH focused their energies on one common obstetric emergency each. Mac chose antepartum haemorrhage (APH). At that time it was the fourth commonest cause of maternal mortality and carried a fetal mortality rate of 59%. Placenta praevia was the commonest cause; an APH was considered an emergency and urgent delivery recommended whether at home or in hospital. The high fetal mortality was generally secondary to prematurity (Table 4). Mac was a great listener to his patients and realized that the majority of women had already had bleeding before presenting but had not attended hospital

or told their midwives. Thus he saw a possibility of trying to help babies reach a more reasonable maturity as close to 38

Table 4:

Comparing obstetric death rates from antepartum haemorrhage between 1932 and 1944: Royal Maternity Hospital (RMH) and within UK and Ireland

a Berkeley C The Journal of Obstetrics and Gynaecology of the British Empire 1936: Pg 393

b Macafee CHG. Placenta previa - A Study of 174 cases. The Journal of Obstetrics and Gynaecology of the British Empire 1945;LII(4): Table 1 Pg 314

Year	Total number of cases	Maternal Mortality (%)	Foetal Mortality (%)
UK and Ireland 1936a	4580	7.0	59.0
RMH 1932-36b	76	2.6	51.3
RMH 1937-44b	174	0.6	23.5

weeks as possible, despite haemorrhage.

His seminal paper published in the Journal of Obstetrics and Gynaecology of the British Empire was important in several areas[9]. It was not only the largest published series of its kind (173 cases) but at that time there was a very fixed mindset to the management of placenta previa. So, to overcome this and to achieve such marked and rapid reductions in fetal mortality rates was incredible. Expectant management became the standard. This paper remains seminal[10].

The importance of educating his junior team cannot be overestimated - 42% of the maternal or foetal deaths occurred in the first two years when "cooperation between senior and junior trainees was "least satisfactory". Table 5 highlights the difference between the first and last 47 cases. What is even more exceptional is table 4 of the results section – this seminal work on placenta previa. Table 5 reproduces this in part and makes the extraordinary statement regarding medical "error of judgement"[9]. How refreshing to see such honesty in a scientific paper.

Table 5:

Birth weights and foetal mortality rates in the series

Macafee CHG. Placenta previa - A Study of 174 cases. The Journal of Obstetrics and Gynaecology of the British Empire 1945;LII(4): Table 3 Pg 316

Year	Average birth weight (pound, oz)	Foetal Mortality (%)
1937 – 39		
First 47 cases	5lbs 2 oz	47
1943 – 44		
Last 47 cases	6 lbs 12 oz	6

There were drawbacks to this expectant management. Women remained in hospital for extended periods - the longest stay was 14 weeks; one patient having 9 APH's before she delivered her baby safely. He would later revise his views in a Lancet article in 1960, having been the Sims Black Travelling Professor for the RCOG to Rhodesia and South Africa. He recognised that management would have to alter in parts of the world where distances were great, access to medical staff and transfusions services were limited or where patients were less compliant[11-13].

SUBSPECIALTY GYNAECOLOGICAL CANCER SURGERY

Fig 7. Robert Campbell Oration Medal - CHG Macafee

He was a skilled surgeon and up to his retirement performed almost all the radical vulvectomies in the province. He had been inspired by the RCS Hunterian Lecture of Mr Stanley Way in February 1948. Way, who graduated from the Middlesex in 1936 (FRCOG 1953, FRCS 1974) was an Honorary Consultant Gynaecologist working in Gateshead, Tyne and Wear. Way was also Lecturer in Gynaecological Pathology, Newcastle University, an Honorary Fellow of the American College and a UK leader in the field of Vulval Cancer[14-16].

Mac would later encourage tertiary referral to his team at the Royal Victoria Hospital. Surgery was performed by Mac, initially with the aid of Eric McMechan (his general Surgical colleague) and latterly purely by his own gynaecology team[5]. The sizeable resection specimen involved an anterior incision beginning at both anterior superior iliac spines with deep and superficial nodal clearance. His nursing team reported back that split skin grafting left such a painful donor site that it should be avoided. The large wound therefore healed by secondary intention apparently without significant septic complications which was testament to the nursing care received. He would avoid division of the inguinal ligament, rather he would dissect it off the pubic tubercle which gave good exposure to the femoral canal and then reattach it to the periosteum of the anterior ascending ramus at the end of the procedure with a much lower femoral hernia rate than ligament division. He left the femoral vessels exposed rather than using a sartorial flap to cover them but did have one fatal haemorrhage in the series.

Figures 7 features the Robert Campbell Oration medal presented to CHG in 1963 by the Ulster Medical Society[17]. He reminded the audience that "when humanity is lost, medicine

is not a noble career". And he highlighted that the motto on the back of the medal reads "Where there is love of humanity there is love of the art"

ALASTAIR LOWRY MACAFEE

Alastair Macafee graduated from Queens' University, Belfast in 1958 and remained fascinated by medicine throughout his career. Those that worked with him in the early days described him as an outstanding Houseman who demonstrated his dedication to his patients and support for his colleagues.

He became a tutor in Pathology and undertook an MD, studying the relationship between blood group and Type 1 diabetes under Professor Sir John Henry Biggart. Post FRCS, he began his surgical training culminating in a Consultant Trauma and Orthopaedic post based out of the Ulster, Musgrave Park and Ards Hospitals. He would hold this position until 1995.

TABLE 6:

Extract from paper highlighting "errors of judgement"

Macafee CHG. Placenta previa - A Study of 174 cases. The Journal of Obstetrics and Gynaecology of the British Empire 1945;LII(4): Table 4 Pg 319

1938	1	Willett's forceps applied Type III. Error of judgment.
	1	version: child could not be resuscitated, although heart beating.
	1	A.R.M. and Willett's forceps.
	1	intrauterine death.
	3	premature.
1939	1	prolapsed cord and version.
	1	version done unnecessarily.
	1	cord inserted at lower edge placenta. Baby died following 5th haemorrhage.
	1	breech, foot extracted.
1940	1	velamentous insertion of cord, one vessel ruptured during A.R.M.
	1	battledore insertion of cord at lower edge of placenta. Willett's forceps applied, and later found to have caught cord. Error of judgment.

ORTHOPAEDIC PRACTICE

His orthopaedic interests were in hip replacement and traumatic injury to joints. He arrived at the Ulster Hospital at a time of increasing expansion in fracture fixation methods for long bone and joint injuries. He was a student and proponent of the Swiss AO Group for rigid internal fixation[18]. He believed passionately in the aforementioned "no touch technique" which he used in the placement of all his total hip replacements, of which he did over a thousand. All of his operations were carried out without putting a finger in the wound. It is believed that his infection rate was very low but data is awaited to support this. To see him reconstruct a shattered elbow was to see a true craftsman at work[18]. The theatre staff looked up to him with reverence and respect.

He published several articles on a wide variety of orthopaedic conditions ranging from fractures of the femoral neck, cervical spine injuries in schoolboy rugby football to intraoperative local anaesthetic infiltration after lumbar discectomy[19-21]. The Musgrave Park results were as good as internationally published data at the time[22].

MANAGEMENT ROLES

He served as medical director at both Musgrave Park and the Ulster Hospitals and also as Chairman of Staff at the Ulster. He found this aspect challenging but brought great experience and wisdom to the post; acting as a wise broker between management and medical staff[18]. He helped secure the building of the Hospital church at the Ulster where he hoped patients, relatives and staff could find solace and comfort through dark and difficult times. He was Vice Chairman of the Board of Governors at Bangor Grammar School for many years and, latterly, President of both the North of Ireland Medico-Legal Society and the Irish Orthopaedic Association. Although he dedicated himself to his profession he was foremost a family man. Figure 8 summarises the Macafee and Lowry Family tree.

When he ceased surgical practice, he greatly enjoyed medico-legal work

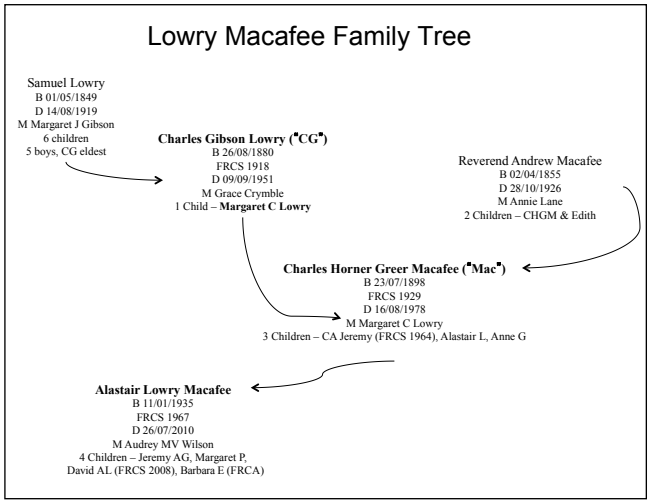


Fig 8. Lowry Macafee Family Tree

which provided an ongoing contact with patients. He enjoyed listening and diagnosing problems and was often teased by staff for thanking patients for attending his clinics. He was a role model of professionalism and courtesy. To his fellow surgeons, Alastair was a gentle giant of a man, an easy friend and a great colleague. He leaves a professional legacy which is one of surgical craftsmanship, a model in commitment to patient care, and honour and grace to all his colleagues (18).

A few further quotations I think sum up his whole ethos towards medicine:

- "Sail with a low sail," or "Put your head in the fetal position because, if you don't, someone else will put it there."
- "Keep your education broad, always remain a student, always copy your betters and seek for perfection, and a happier and better man you will be"

- "The good physician treats the disease; the great physician treats the patient who has the disease." [23]
- "Be natural, be kind. Leave your patients if not in better health at least in better spirits." [23]

CG Lowry and CHG Macafee lived in extraordinary times for medicine. There was so much potential for improvements in mortality; rapid technological advances; and such enthusiasm amongst the leaders of medicine – setting up the RCOG, improving outcomes, sharing experience internationally. Alastair Macafee was also a surgical gentleman with a great love of humanity. He leaves no large institution as a legacy but he had a passionate sense of purpose, and ideals just as strong as that of his predecessors. He inherited his father's approachability, sense of calm and gentleness. Personally, what I have learnt from reviewing the professional lives of these three great men is that to achieve and maintain the highest of professional standards, you need to:

- have good clinical acumen and medical knowledge
- work hard
- collaborate with other experts
- challenge the accepted norms or those who wrongly impede progress
- uphold the finest traditions of our profession – honesty, integrity and humanity

What these three Ulster surgical gentlemen had in common was the sentiment that whilst medicine is undoubtedly a science, it deals with people and not things.

CONFLICTS OF INTEREST:

The author is the son of A L Macafee and hence a direct descendant of all three surgeons. However, the data presented is from peer reviewed journals and the article has been independently peer reviewed. The author has received educational support from Ethicon Endosurgery during his surgical training but there is no link with this historical article. The author has no financial, political or other intellectual conflict of interests.

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Letters

NICORANDIL AS A CAUSE OF PERINEAL ULCERATION.

Editor,

We report a case of extensive perineal ulceration that healed spontaneously on discontinuation of nicorandil therapy, avoiding major perineal reconstructive surgery. We note a previous report of penile ulceration related to nicorandil therapy in this journal and wish to remind readers to consider nicorandil as a causative agent for any ulcerated non-healing chronic wound.[1]

Case

An 82 year-old man presented with an 18 month history of painful perineal ulceration. He denied any other colorectal or gastrointestinal symptoms. His past medical history included myocardial infarction, atrial fibrillation and prostatic carcinoma. He received no radiotherapy to treat his prostatic carcinoma. He had been commenced on nicorandil 30mg twice daily 18 months previously following his myocardial infarction. Soon after this, he reports the gradual onset of painful perianal ulceration.

Biopsies performed by the referring specialty had excluded malignancy and inflammatory bowel disease. On initial review by Plastic Surgery he was found to have a deep 3x1cm area of ulceration adjacent to his anus, which was sloughy and had well circumscribed margins (Figure 1). Microbiological investigations were negative.

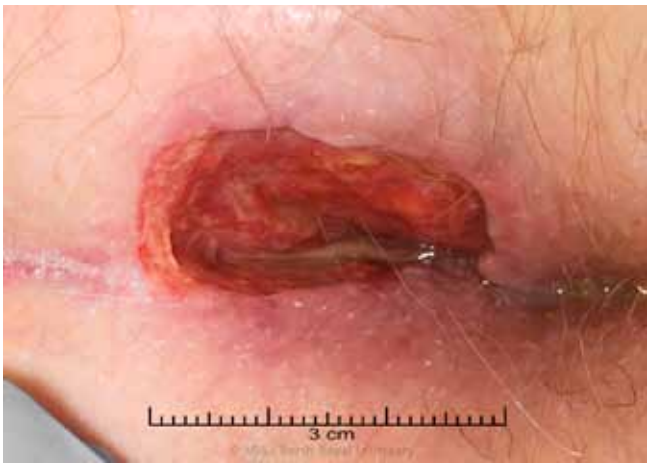

Fig 1. Ulcer at presentation.

Under the guidance of the patient's cardiologist, his nicorandil was discontinued and the dose of his Beta-Blocker was increased. On review at one month he was pain free and the ulcer was healing. At 5 months the defect had completely healed and he remained pain free.

Discussion

There are many causes of perineal ulceration for which malignancy and inflammatory bowel disease (Crohn's disease) account for the majority.[2,3] Other causes include infective, neoplastic, Extra-mammary Paget's disease, pharmacological and auto-immune.

Patients presenting to plastic surgeons with chronic perineal ulceration can have passed through several other specialties and have often undergone a plethora of haematological, microbiological, endoscopic and radiological gastrointestinal investigations prior to referral.[2] In addition they may have undergone several tissue biopsies.

Nicorandil is used as a third line agent in the treatment of angina and ischaemic heart disease.[2] It's pharmacological effects result in vascular smooth muscle relaxation dilating peripheral and coronary resistance arterioles, therefore increasing coronary blood flow.[2]

Nicorandil has been reported as a cause of mucosal ulceration in the gastrointestinal, gynaecological, surgical and urological literature.[1,2,3,4,5] It has been associated with non-healing surgical wounds. Despite the link of nicorandil and painful perineal ulceration being reported in the literature, this patient passed through the care of a colorectal surgeon and the medical physicians prior to seeing the plastic surgeons. This would suggest that this link is not generally known about.

The onset of perianal ulceration after starting nicorandil can vary from several weeks to months, but healing on withdrawal of the drug is characteristic of nicorandil-induced ulceration. Some authors have suggested that the ulcerative effects of nicorandil may be dose dependent and patients on doses of 10mg daily are at risk of ulceration.

In summary

We report a case of extensive painful perineal ulceration that healed spontaneously on discontinuation of nicorandil therapy. Failure to recognise nicorandil as an aetiological factor in the development of perineal ulceration may lead to unnecessary surgical intervention.

The authors have no conflict of interest.

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MASSIVE PULMONARY EMBOLUS PRESENTING WITH ABDOMINAL PAIN

Editor,

We present the case of a 20 year old man who presented to the emergency department of Craigavon Hospital with a one day history of abdominal pain and dyspnoea. He had been involved in a motorcycle accident three days previously and sustained a soft tissue injury to his left leg. Examination revealed lower abdominal tenderness and left calf swelling. Blood pressure was 140/53mmHg and oxygen saturations were 97% on room air. ECG showed sinus tachycardia (137 beats per minute) and 2mm upsloping ST segment elevation in leads V1-V4 (figure 1).

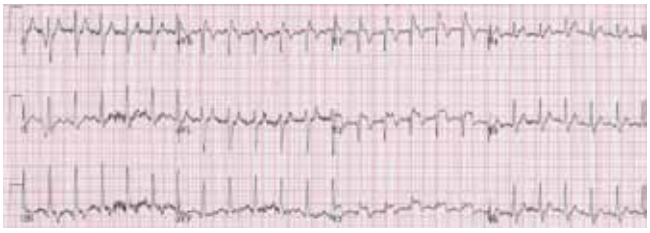

Fig 1.

Ten minutes after arrival, he had an asystolic arrest. Cardiopulmonary resuscitation was commenced, 10 units of intravenous reteplase were administered and he transferred to the cardiac catheterisation laboratory. Myocardial infarction was thought unlikely, thus we proceeded first to pulmonary angiography which showed a large filling defect in the main pulmonary artery extending into left and right branches consistent with a saddle embolism (figure 2). Catheter manipulation and direct intra-embolus injection of further reteplase achieved slight clot fragmentation into smaller sub-branches, but no significant return of pulmonary artery flow or systemic circulation. The resuscitation attempt was discontinued after 90 minutes. Autopsy confirmed a left leg deep venous thrombosis, a saddle-type pulmonary embolism and normal coronary arteries.

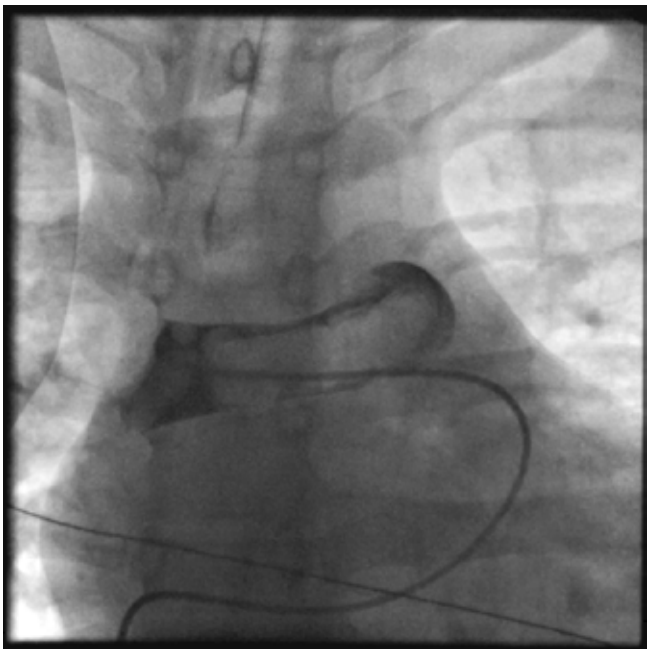

Fig 2.

This case highlights the often atypical presentation of pulmonary embolism[1,2], the feasibility and value of early invasive pulmonary angiography even during cardiac arrest, but also the need for ongoing development of percutaneous techniques/devices for effective large-clot fragmentation or removal.

The authors have no conflict of interest.

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STREAMLINING THE USE OF IHC IN IDENTIFYING GERMLINE MISMATCH REPAIR MUTATIONS IN LYNCH SYNDROME.

Editor,

Colorectal cancer (CRC) is the second most common cause of cancer-related death[1]. Inherited genetic factors are significant in <30% of cases. In ~5% of all cases[2], CRC is associated with a highly penetrant dominant or recessive inherited syndrome. The most common of these is Lynch syndrome (hereditary non-polyposis colorectal cancer, HNPCC), an autosomal dominant cancer susceptibility syndrome caused by a germline mutation in one of the DNA mismatch repair (MMR) genes, namely MLH1, MSH2, MSH6 or PMS2. Affected individuals have a predisposition to developing early onset CRC and a range of other cancers, particularly endometrial in females. The associated lifetime cancer risk is 75%[2]. Early diagnosis enables at risk family members to be enrolled in appropriate cancer surveillance programmes, thus reducing mortality and morbidity. Additionally, recent studies have indicated a role for aspirin in reducing Lynch syndrome tumours[3].

MMR defect leads to instability in microsatellites of tumour DNA. This feature can be found in >90% of colon cancers associated with Lynch syndrome, compared to ~ 15% of cases of sporadic CRC[2]. Using immunohistochemistry (IHC), tumour analysis with antibodies against the four MMR proteins demonstrates loss of protein expression of the causative gene. This investigation thereby provides early, valuable identification of possible HNPCC-related tumours. It furthermore directs germline mutation screening to the gene involved, significantly reducing the time and cost involved in

searching for a causative mutation and prioritising families in which this limited resource should be applied. When individuals are identified with a germline MMR mutation, there are implications for long term screening requirements and possible prophylactic gynaecological surgery to reduce cancer risk[4]. Germline mutation identification also allows predictive testing for at risk family members.

Currently the Amsterdam criteria II and revised Bethesda guidelines are used to identify families with potential Lynch syndrome for further investigation (Box 1). MMR IHC provides key information in this assessment. Delay in the time taken to obtain IHC results negatively impacts upon the overall time to obtain germline mutation screening results. While awaiting germline mutation screening, individuals and their relatives may either not access appropriate screening or may undergo serial, unnecessary screening with associated risks and anxieties.

The authors performed a study to assess current regional practice in utilising MMR IHC[5]. 32 patients were identified with abnormal MMR IHC. Of these, six fulfilled Amsterdam criteria II and 26 fulfilled revised Bethesda criteria. 23 had CRC at an average age of 48 years (range 32-76). 11 had endometrial cancer at an average age of 56 years (range 36-67). The median wait for MMR IHC result was 69 days from time of request (range 1-588 days). Causes of delay included time required to locate appropriate pathology records, request pathology tissue for testing (from a range of pathology laboratories) and perform and interpret the assay. In 26 of 32 cases, IHC was requested by the clinical genetics team at the time of first genetics clinic appointment.

We would encourage our surgery and pathology colleagues to consider the diagnosis of Lynch syndrome and adopt the practice of requesting MMR IHC (where cases fulfill revised Bethesda criteria) at the time of surgery or prior to referral to clinical genetics, in order to streamline the investigation of possible Lynch syndrome and expedite germline mutation identification in such families.

The authors have no conflict of interest.

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Box 1 Amsterdam criteria II and revised Bethesda guidelines **

Amsterdam criteria II

There should be at least three relatives with colorectal cancer (CRC) or with a Lynch syndrome-associated cancer: cancer of the endometrium, small bowel, ureter or renal pelvis.

- one relative should be a first-degree relative of the other two,
- at least two successive generations should be affected,
- at least one tumour should be diagnosed before the age of 50 years,
- familial adenomatous polyposis (FAP) should be excluded,
- tumours should be verified by histopathological examination.

Revised Bethesda guidelines

1. CRC diagnosed in a patient aged <50 years.
2. Presence of synchronous, metachronous colorectal or other Lynch syndrome-related tumours*, regardless of age.
3. CRC with MSI-H phenotype diagnosed in a patient aged <60 years.
4. Patient with CRC and a first-degree relative with a Lynch syndrome-related tumour, with one of the cancers diagnosed at age <50 years.
5. Patient with CRC with two or more first-degree or second-degree relatives with a Lynch syndrome-related tumour, regardless of age.

* Lynch syndrome-related tumours include colorectal, endometrial, stomach, ovarian, pancreas, ureter, renal pelvis, biliary tract and brain tumours, sebaceous gland adenomas and keratoacanthomas, and carcinoma of the small bowel.

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James Logan Prize Essay

The Challenges of Cancer Pain Assessment and Management

Kerry Maxwell

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Approximately one quarter of the world's population will develop cancer at some point in their lifetime. A high proportion will experience associated pain.[1,2] Despite the World Health Organisation (WHO)'s assertion that over 80% of cancer pain is responsive to inexpensive oral medication,[3] research suggests it remains undertreated in both the developed and the developing world.[1] To understand why, it is necessary to identify the ongoing challenges in the assessment and management of cancer pain, and recognise the complex nature of all pain and of cancer pain specifically.

Pain is often defined as 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage'.[4] One of the challenges in addressing pain is negotiating this triad of sensory, emotional and physical (or quasi-physical) dimensions. On an even more fundamental level, the essentially experiential nature of pain makes it profoundly challenging to define and to assess. By its very nature we cannot know someone else's pain, nor as doctors can we capture it with imaging techniques, biochemical tests or other medical means. In this sense the more colloquial definition of pain as 'what the patient says it is' may be more pragmatic.

Attempting to define cancer pain as a specific subset of pain more generally is problematic. There really is no homogenous entity of 'cancer pain'; pain in cancer can encompass the full range of physiological subtypes (nociceptive, neuropathic, visceral, somatic), and be inflected by a multitude of emotional, psychological and spiritual factors. If there is anything unique about cancer pain, it may be the heightened role which these non-physiological dimensions play; pain in cancer is often tied up with concomitant psychosocial upheaval and existential anxiety. To many cancer sufferers, their pain has a 'sinister meaning' over and above its inherent unpleasantness as a sensory experience.[1]

The first key issue in assessing cancer pain is communication, and patients identify this as a major concern.[5] Quantitative and qualitative assessment of cancer pain relies primarily on patient description.[5] Methods for assessing pain severity focus on self-reported rating scales (e.g. visual analogue scales, McGill Pain Questionnaire) and/or on functional aspects such as interference with sleep or impairment of daily activities.[2,5] Similarly, information about the physiological origin of a particular pain comes from a good history. (For example neuropathic pain might be described as 'burning' or 'shooting', as distinct from the 'ache' or 'throb' of somatic nociceptive pain). Being able to differentiate pain in this way is key in identifying and treating any reversible underlying causes, and in selecting appropriate analgesic agents and adjuvants.

The most obvious challenges to communication arise when the patient is cognitively impaired, or unable or too ill to express him/herself.[5] But there are also more subtle challenges to effective communication, arising from the relationship between the clinician and the patient on an interpersonal level. In the context of cancer, there may be particular challenges involved in establishing good therapeutic relationships. There are often heightened emotions and fears, doctors are often the bearers of bad news, and there may be ambivalence surrounding the fact that some of the pain and distress experienced may be due to medical interventions such as surgery, chemotherapy or radiotherapy.[2] Openness, honesty and empathy are essential to establish the trust necessary for effective communication.

Where it is achieved, good communication promotes concordance with medication[5] and can help overcome negative misconceptions about analgesics, which sometimes limit their uptake (for example fears about opioid addiction or side-effects[6]). It may also combat under-reporting of pain arising from the desire to be a 'good' (ie uncomplaining) patient, or from fear and denial due to the belief that increasing pain implies disease progression.[5,6]

In practice, because cancer care increasingly takes place in the community, the role of family and other lay carers in the assessment and management of cancer pain is often substantial, whether or not there is a specific impairment of the patient's ability to communicate.[6] Caregiver's attitudes to cancer pain and its management have been shown to have a significant influence on the patient's experience of their disease.[6] The challenge for the clinician, therefore, is to foster understanding and build up a relationship not just with the patient but also with his/her family or carers.[5]

When it comes to the pharmacological management of cancer pain, the standard approach follows the WHO's 1986 cancer pain relief programme, including the three step analgesic ladder.[5,7] As simple as this may seem, in practice there are a range of difficulties for the clinician. Firstly, as discussed, cancer sufferers experience many different physiological types of pain. Furthermore, many cancer patients have multiple pains; research suggests one third have a single pain, one third have two separate pains, and one third have at least three different pains.[11] The clinician needs to be able to differentiate

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these and select appropriate adjuncts and combinations of analgesics. Dosing can also be complicated, particularly for opioids, as there is no standard dose and no set upper limit.[3,7] A regimen to control both background and breakthrough pain is often necessary, and this must be tailored to the individual and adjusted over time if pain levels change.[5] The clinician must also be able to adapt medications for different routes of administration if oral intake is not possible.

Sadly, in many resource poor countries, the primary challenge to implementing the WHO's recommendations is access to the drugs, in particular opioids.[1,8] This is in part a by-product of international narcotics control measures, and local policymakers' fears about diversion and addiction.[8] In some countries the prevailing medical culture is uncomfortable or unfamiliar with opioid use, and there is often a deficiency of clinicians with the necessary knowledge of pain management.[1,8]

As well as pharmacological means, the clinician may also need to consider interventions such as surgery, radiotherapy or chemotherapy in order to control pain.[5] This can raise complex dilemmas about a patient's fitness, overall treatment intent, and the relative merits of the different approaches.

With any intervention, pharmacological or non-pharmacological, there is the question of balancing benefits and side-effects. (Radiotherapy may relieve pain from bone metasases, but might also cause a painful skin reaction.) It is also important not to equate pain relief alone with improved quality of life. For example, large doses of opioids may be needed to eliminate pain in some patients, but this can induce considerable levels of sedation. For some this may be an undesirable trade-off. As the poet Byron put it, 'the great object of life is sensation, to feel that we exist, even in pain'.[9] For many patients maximising analgesia might still be preferable; balancing the wishes of the individual is key.

Perhaps the greatest challenges for the clinician dealing with a cancer patient in pain lie beyond traditionally medical problems. WHO guidelines state that 'relief of psychological, social and spiritual problems is paramount' and furthermore 'attempting to relieve pain without addressing the patient's non-physical concerns is likely to lead to frustration and failure.'[7] What is required is holistic care. Part of such an approach is an empathetic therapeutic relationship, as discussed above, which by necessity incorporates an appreciation of the psychosocial dimensions of the experience of cancer.[5] There may also be a role for interventions such as antidepressant medication, or referral for cognitive therapy.[5] It is essential to co-ordinate care with a multidisciplinary team that may include physiotherapists, occupational and speech and language therapists, social workers etc.[5] Clinicians should be aware of and sensitive to a patient's spiritual or religious beliefs, and where appropriate facilitate input from chaplains or others who can provide spiritual support.[5]

Indeed one of the challenges for clinicians in these situations may be recognising that ultimately there are some aspects of cancer pain management that do not fall within the remit of the medical profession. As critics like Ivan Illich have argued, while modern medicine is often very good at the physiological relief of pain, it is very limited in its ability to elucidate meaning in human suffering.[10] Research has reinforced the idea that people need 'a sense of meaning to life' to be able to cope with their cancer and sometimes its treatments.[5] This is especially true in palliative care. In response, it is important to avoid over-medicalisation, in order to allow room for other kinds of coping and meaning-making. Good pain relief should facilitate the patient in his/her own ways of dealing with the experience of cancer.

In conclusion, the challenges to the assessment and management of cancer pain are multifarious. They include establishing good communication and a positive therapeutic relationship with patients and their carers, and overcoming ambivalences about medical intervention and popular misconceptions about analgesics. Shortage of opioids is a serious problem, the solutions to which may be as much political as medical. Even where all options are available, a sophisticated approach to choosing treatments is required, and to be effective, cancer pain management must be holistic, involving a multidisciplinary team and taking cognisance of the psychosocial and spiritual dimensions of the patient's experience. Finally, it is essential, if not always easy, to recognise that medical management of pain should not be an end in itself, but should be conducive to improving the overall quality of life of the patient.

The author has no conflict of interest.

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So you want to be a **Foundation Doctor**

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The torment of medical finals has subsided and you have been rewarded with the honour of graduating with a medical degree. A few months of recuperation and FY1 commences with an induction period where you are imparted with a number of essential protocols. The remainder of the induction comprises a variety of speakers who often are incorporated into the programme to make you aware of services specific to the hospital you have been assigned.

Your first year as a doctor passes by in a whiz of venflons, ward rounds and discharge scripts. The best learning opportunities occur when you are faced with a sick patient or an unfamiliar symptom. You make your initial assessments and intervene where appropriate. By completing an Advanced Life Support course early in the year, your competence and confidence in approaching sick patients can be greatly boosted.

As an FY1 with limited experience, you will call on your SHO when unsure of a diagnosis or management plan. This presents an ideal opportunity to learn from your seniors and gain feedback on your initial assessment and proposed management plan. After a few short months you will have progressed to FY2 and will have the new FY1s approaching you for advice and support. They will ask for guidance in the treatment of patients but also in coping with the adjustment to life working as a doctor. The long working hours and pressure to perform can take its strain. Some adapt quickly to their new roles, while others take time to develop new coping strategies and methods of managing the emotional stresses. By sharing your experiences of FY1 you can give reassurance and encouragement to those who need it.

FY2 also brings a number of new challenges and duties. You will be faced with new clinical tasks including outpatient clinics, taking referrals from other specialties and perhaps performing more advanced procedures. You will hold a more senior position within your team and will not only have to prioritise your own jobs but delegate tasks to your juniors. This may also include organisation of post-graduate teaching sessions and clinical audits.

Applying for specialty training is an additional challenge faced during FY2. There are many resources available to both research a variety of specialties and to make yourself competitive for the application process. It is important to find time to organise a taster module. These few days in your chosen specialty provide ample opportunities to speak to both trainees and trainers. You can gain an insight into the training involved in the specialty and also the lifestyle you can expect as you progress. They can also advise you on appropriate courses to attend and suitable audit or research topics. Ideally you should complete the audit cycle and present your results at a local or national meeting or have them published in a journal.

Having researched specialty training, some will decide upon an alternative route following FY2. There are those who are attracted to spending time abroad, while others are keen to pursue a contrasting post-graduate qualification such as a music diploma.

Whatever route you take through your Foundation Years, it is a time to recognise and develop the knowledge and skills you acquired during medical school. You will value the time as an opportunity to gain confidence in your abilities and to develop friendships across all disciplines. It is an opportunity to reflect on your work and institute change where you see a difference can be made. Above all, your Foundation Training is a period during which you can make plans and preparations for your future life and career.

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