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COLOPROCTOLOGY AND THE PELVIC FLOOR

When one hears the quote 'Standing on the shoulders of giants' one usually thinks of Sir Isaac Newton. However Newton didn't originate the saying, rather the 12th century theologian and author John of Salisbury used a version of the phrase in a treatise on logic called *Metalogicon*, written in Latin in 1159. I will endeavour to demonstrate how we have stood on the shoulders of others thus enabling us to see so much more.

1806 Belfast population 20,000. Nineteen doctors and surgeons founded the Belfast Medical Society. McDonnell, Drummond, Andrews and McCormac are the giant names of the period. But while they played their parts in the activities of the Belfast Medical Society, their fame lies with their great professional acumen, and the early days of the Belfast Medical School.

1853 saw the launch of the Belfast Clinical and Pathological Society. Andrew Malcolm, who like myself was a native of Newry, was the first secretary. He thought that the Belfast Medical Society was too narrow in its interests, as it catered only for doctors and surgeons residing in or near Belfast. The new Society, which Dr. Malcolm succeeded in founding, had a wider outlook, and made provision both for town and country membership. At its foundation there were forty-nine members, and before its first year had been completed there were ninety-six. Dr Malcolm, although he died at the young age of 37, is still remembered in the Royal Victoria Hospital today with the Malcolm Exhibition.

In April 1862 the two societies met and agreed to amalgamate to form the Ulster Medical Society

There have been many great members and Presidents: William MacCormac, a Baronet and President of the Royal College of Surgeons of England; Robert F. Dill, Professor of Midwifery; Sir John Walton Browne and William McKeown, both pioneers of Ophthalmic Surgery in Belfast, and Sir John Fagan, a distinguished surgeon and one of the founders of the Belfast Hospital for Sick Children.

From the Society's point of view, perhaps the greatest of all was Sir William Whitla. A native of Monaghan, he started life as a pharmaceutical chemist, attended the Queen's College, qualified in medicine, and became a distinguished consultant physician in Belfast. His great contribution to medicine was his gift for popularising what was then known of the action of drugs and the medical treatment of disease.

The earliest record which suggests that there were specialists for colorectal diseases in Egypt exists in the Ebers Medical Papyrus c. 1700 BC. It gives 33 prescriptions for the treatment of anorectal diseases.

Hippocrates 460–377 BC wrote on the treatment of haemorrhoids by cutting, excising, sewing, binding and cautery. Cautery: "Force out the anus as much as possible with the fingers, make the irons red-hot and burn the pile until it be dried up and so no part may be left behind" I doubt Hippocrates had a problem with a review backlog.

Roger Frugardi, or Roger of Salerno as he was known, likewise wrote about his treatment of haemorrhoids, anal fistulae as well as other colorectal problems.

John Arderne recognised that ischiorectal abscesses are a cause of fistula-in-ano and urged they be opened before they rupture into the rectum. My problem with this well known picture of John Arderne isn't the size of the fistula probe which he is using but rather it is like one of those M C Escher paintings where things don't quite look right. In other words the patient has no body but has a face. More importantly however, it looks like the patient's left leg is closest to John's right leg and conversely the patient's right leg is at his left leg.

The theme for this year is 'Standing on the Shoulders of Giants'. As mentioned earlier John of Salisbury in 1159 wrote that Bernard of Chartres used to say that we are like dwarfs on the shoulders of giants, so that we can see more than they, and things at a greater distance.

In the Hunterian Museum at the Royal College of Surgeons of England there is a case containing the skeleton of the 8 foot 2 inch Irish Giant, Charles Byrne, as well as that of a dwarf. Charles Byrne was from Co Tyrone and he paid to be buried at sea. It appears that that John Hunter, the famous Scottish surgeon, succeeded in bribing the undertakers with the sum of £500 while they were part-way on their jour-

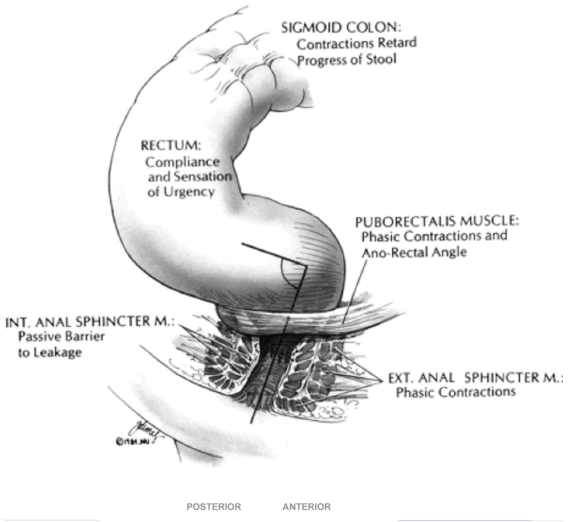
ney to dispose of the body, and that he brought back the giant to his own house and had the skeleton prepared for his Museum. In my mind this is something which detracts from John Hunter's otherwise gigantic legacy.

Sometimes one doesn't stand on the shoulders of giants but rather follow in their footsteps. I had the privilege to give the Royal Victoria Hospital Purce lecture in 1988. Barney Purce was President of this Society in 1947–48 and the inscription on the back of the medal which I received is: "My sword I give to him that shall succeed me in my pilgrimage, my courage and skill to him that can get it." The saying is from John Bunyan's Pilgrim's Progress.

For the interests of my contemporaries I will show only one picture of a Solitary Rectal Ulcer tonight. This is a rare condition of which there will have been approximately 150 to 200 patients diagnosed in Northern Ireland. I am indebted to Professor George Parks for stimulating my interest in Coloproctology and the Pelvic Floor by suggesting that I investigate the pathophysiology of the condition for the purpose of my Master's Thesis. Many of the investigative tests I will mention tonight were introduced to Northern Ireland to allow investigation of the condition.

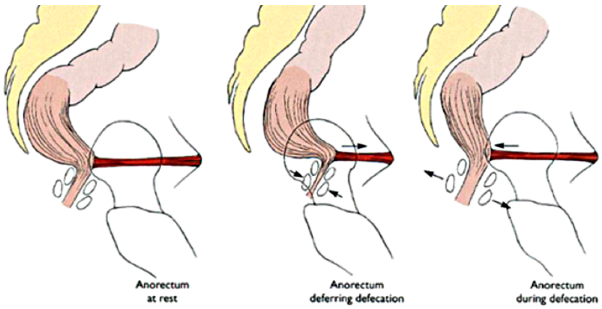
To help understand the pelvic floor one needs to remember the anatomy. Anal canal length is between 2.5 and 4 cm in length. It consists of an internal ring of muscle and an external ring. The lower 1 to 1.5 cm is covered in skin and above the dentate line it is mucosa. There are numerous bare nerve endings in the anal canal which help to distinguish flatus from fluid and faeces.

Defaecation is complex and involves an interaction of anal function & sensation, also colonic transit,



rectal compliance, sphincter function, anorectal sensation, stool consistency, stool volume, and mental alertness. The sphincter muscles in combination with the pelvic floor musculature then maintain continence.

The major structures of the anorectum are the rectum, the puborectalis muscle which forms the anorectal angle, and the internal and external anal sphincters surrounding the anal canal. Sensory mechanoreceptors in the perirectal tissues allow perception of rectal filling or distension, whereas anal nerve endings permit discrimination of gas, liquid, and solid rectal contents.



At rest (above left), the anorectal angle of approximately 85° to 105°. Most of the resting pressure in the anal canal is derived from the internal anal sphincter and exceeds intrarectal pressure. The movement of faecal wastes to the rectum temporarily relaxes the internal anal sphincter; defaecation is deferred (above centre) by contraction of the puborectalis muscle and external anal sphincter, the former narrowing the anorectal angle and the latter increasing pressures in the anal canal until the rectum accommodates to its increased contents and propulsive forces are diminished.

During defaecation (above right), increased intra-abdominal pressures help to propel bowel contents toward the anal canal while relaxation of striated muscles results in perineal descent, widening of the anorectal angle, and decreasing pressures in the anal canal. After defaecation is completed, anorectal structures return to their normal resting position.

Pelvic floor physiology tests include research of anatomy and physiology, and of disease pathology.

One of the two biggest clinical manifestations of pelvic floor problems is constipation. Basically constipation can be simplified as being due to one of two factors. Either delayed colonic transit ie a problem with delivery of colonic contents to the rectum or can be due to difficulty in evacuation or obstructed defaecation. In 1985 what I set out to do was to have techniques to investigate both problems.

Colonic transit of markers. In the simplest form of the technique 20 radiopaque markers are swallowed on Day 0, and abdominal radiographs are taken on Day 1 and again on Day 5 to locate the markers. Once there is an abnormally high number of pellets (ie 5 or more residual pellets) then there is a delay in transit. What one now needs to do is show if there is a problem in evacuation.

Hertz in 1909 gave patients bismuth carbonate orally the night before and then screened the patients to observe colonic motility.

Kerremans used a mixture of plasticine, talc, microlax and barium and then used cineradiography to observe emptying.

Preston et al used a balloon filled with 100ml of barium to measure pelvic floor descent and ano-rectal angles at rest and while straining

Mahieu then in 1984 described a technique for assessing the pelvic floor and rectal emptying which I thought could work.

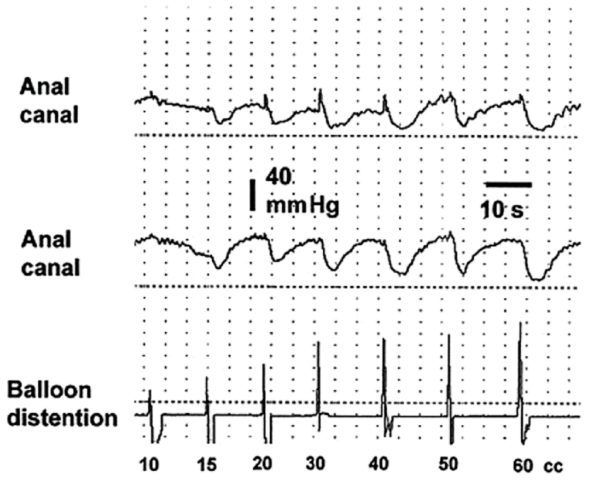
To start proctography in Northern Ireland I needed the assistance of a radiologist so I went and spoke to Dr Manton Mills about my idea of evacuation proctography. I must admit I was surprised he didn't have the same enthusiasm.

Manton refused to be seen in main X-Ray performing such a test so the antique screening equipment in the Department of Surgery was serviced. I had a perspex commode built which could be bolted to a screening table. Following approximately six proctograms he realised that the test worked and the patients, while not enjoying it, preferred it to a barium enema which they found significantly more embarrassing. I knew he was convinced when he told me that we were moving to main X-Ray in the Royal Victoria Hospital to carry out any future proctograms.

What can you diagnose with the test? Large anterior rectocele. These can be seen filled with barium but several studies have demonstrated that rectoceles are common in women without defecation complaints so that caution is necessary before implicating a rectocele as the cause of defecation difficulty.

Rectal intussusception. The anorectum is filled with barium paste and can appear normal but during attempted evacuation, inversion of the rectal mucosa can occur during maximal straining and no further emptying occurs. The vagina can be identified by a radiocontrast soaked tampon lying anterior to the rectum.

When one thinks of ano-rectal physiology tests the first to spring to mind is ano-rectal manometry. Lots of methods have been described: open-tip catheters, sleeve catheters, balloon catheters and micro-transducers. I used the latter but they have gone out of fashion and now side perfused catheters complete with a balloon for rectal distension are more commonly used now.



Here on the top 2 lines you can see anal canal pressures being measured 1cm apart. On the bottom line you can see a balloon is distended with increasing amounts of air. In response there is the recto-anal inhibitory reflex. The presence of this means the cause of obstructed defaecation is not Hirschsprung's disease and vice versa. Anorectal manometry can also be used to measure the length of the anal canal as well as the resting and squeeze anal pressures. Is anorectal manometry of any clinical use other than diagnosing Hirschsprung's? It is of limited use in predicting the nature of the symptom but of no use in predicting the severity.

Others have also found that anorectal manometry is of limited benefit in diagnosing anorectal problems and there has even been one report of a perforation of the bowel afterwards. I am glad that when I did my thesis that this had not been reported as I doubt I would then have been able to persuade my colleagues to have their anal pressures measured.

There are a number of types of faecal incontinence: sensory (patient not aware of it, neuropathic, rectal prolapse), motor (patient aware, but cannot prevent), urgency (radiation, IBD, poor reservoir), and soiling (anal scarring, ileal pouch, impaction).

Examples of impaired rectal reservoir are inflammatory bowel disease or radiation proctitis. Examples of reduced rectal reservoir are low colorectal or coloanal anastomosis or an ileoanal pouch reconstruction. Examples of disease directly causing incontinence are fistula-in-ano, tumour and rectal prolapse.

Assessment consists of history and examination, with attention being paid to perineal deformity, scars, perineal descent, prolapse, digital rectal examination, resting and squeeze pressure, the recto-vaginal septum, and perineal sensation

Pudendal Nerve Terminal Motor Latency (PNTML) is a basically a nerve conduction test. Using a stimulating electrode at the tip of the glove you feel trans-anally for the ischial spine and then stimulate the pudendal nerve. Resulting contraction of the external sphincter is picked up using surface EMG at the base on the index finger. The delay is the nerve conduction in the pudendal nerve and should be approx 1.9ms +/- 0.2ms.

I also carried out anal sphincter EMG to assess the site of any sphincter defects. While it worked it required multiple insertions of a needle perianally which most patients to say the least did not like. A far better way of assessing sphincter defects is anal ultrasound.

Normal anal endosonography shows the subepithelial tissues to be slightly hyperechoic. Beyond them the internal sphincter creates a well-defined hypoechoic ring, the hyperechoic longitudinal muscle surrounds the internal sphincter, and the external sphincter envelopes the longitudinal muscle. Using endosonograpy it is possible to see disruption of the internal and external anal sphincters.

Such injury may be seen after delivery in up to 35% of primips, 44% of multips, and in 80% after the use of forceps. There may also be a pudendal neuropathy. Symptoms may not be present but if they are they tend to worsen with time.

Surgical options include sphincter repair, injectable agents, sacral nerve stimulation, dynamic graciloplasty, artificial sphincter, stoma, and ACE

Eighty percent are improved by sphincter repair but deteriorate with time; dynamic graciloplasty shows variable results with 35–85% achieving continence but with complications in 50%; sacral nerve stimulation is used where the sphincter is weak but intact and shows good results with up to 90% improvement; and stomas have their own complications of parastomal hernia, mucus leakage and diversion colitis.

Another major cause of anorectal problems is that of fistula-in-ano. MRI is useful in showing abscesses, contralateral disease and other pathology. There have been a large number of methods of treating fistula-in-ano described including loose or cutting setons, fibrin glue, mucosal advancement flaps.

Sealing the tract with a collagen plug has also been suggested but I personally have not found it to produce great results. A technique has been described whereby the fistula tract is disconnected and ligation of the intersphincteric tract. Likewise the results are not perfect.

Usually when there are multiple techniques described it is an indication that there is no one perfect method.

So the mainstay of treatment is still that of a fistulotomy. Which if performed as a staged procedure can maintain faecal continence while producing healing.

Can you make use of the fact that many people in western society can spend an inordinate amount of time sitting staring at the toilet door in front of them? With this in mind we embarked in the Southern Board on a Bowel Cancer awareness programme. We had laminated notices put upon the back of the toilet doors in supermarkets, public buildings etc. They described the high risk symptoms of bowel cancer and simple measures to prevent it. I found it surprising that several years later some patients presenting with bowel cancer symptoms did so because they had sat and read one of our notices in a public toilet.

Voltaire the famous philosopher, writer, defender of rights and historian of the Eighteen century once said that one of the essential gifts one should look for in a wife is the ability to administer an enema daily and pleasantly. I think he recognized a problem, however I think his solution is somewhat drastic. Personally I would stick to a high fibre diet and avoid straining at stool. John Alexander Williams of Birmingham used to reckon that 2 minutes was an adequate amount of time to pass a stool and any longer ran the risk of causing problems to your pelvic floor. He suggested toilets should be spring-loaded to eject the occupant after 3 minutes before they did any harm to themselves.

It is alleged that Lord Edward Thurlow a former Lord Chancellor of Great Britain once said in the Houses of Parliament “There is no more science in surgery than in butchering”. However it is worth noting that he lived in No. 42 Lincoln’s Inn Fields from 1777–82. His house ultimately was demolished to become part of the Royal College of Surgeons of England site. I hope I have shown you in the course of this evening that he wasn’t totally correct.