# Integrating Science and Technology to Proctology

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**Take-Home Pearls**

- Fistulotomy remained the standard of care in low fistula.
- Technological innovation has improved our understanding of the anatomy of anal fistula.
- Many new treatment modalities have been proposed for the management of anal fistula. But none has yet become standard of care.
- Technological advancement has given us more options of treatment for haemorrhoids.

## 12.1 Anal Fistula

Historical records of the surgical treatment of anal fistula date back to the time of Hippocrates in 430 BC, when the use of seton was first described. Since then, the management of this complex condition has intrigued many physicians, including Eisenhammer, Goodsall and Parks, all of whom made observations which have helped shaped the understanding and management of this condition.

Successful management of any condition requires the understanding of its pathogenesis. In anal fistula, the cryptoglandular theory remains the most quoted hypothesis that accounts for the majority of anal fistulas. Some of the other predisposing factors leading to formation of anal fistula include Crohn's disease, tuberculosis and malignancy. In the cryptoglandular theory, the spread of sepsis from the infected crypt gland in the intersphincteric space can occur in three planes – vertical, horizontal and circumferential. The direction of the spread often denotes the type of abscesses seen. A caudal spread of the sepsis will result in a perianal abscess, while

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a cephalad spread will result into either a high intermuscular or supralevator pararectal abscess. Horizontal or lateral spread through the external sphincter will result in an ischiorectal abscess. Circumferential spread can occur in any of the abovementioned planes.

The presence of an external opening near the anus often denotes the presence of an underlying anal fistula. Patients typically present with a persistent discharging lump or occasionally following previous surgery that was performed to drain an associated abscess. Apart from the location of the external opening, it is important to exclude any underlying abscess that will require a drainage procedure. At the same time, one should palpate for the presence of an indurated tract medial to the external opening as it veers towards the anus. This would indicate the presence of an underlying fistula tract. It is also vital to perform a digital rectal examination to evaluate and document the passive and active anal tone.

The importance of the location of the external opening is highlighted by David Henry Goodsall back in the 1900s. The Goodsall rule states that, with a patient lying in a lithotomy position, an external opening anterior to the line passing through the middle of the anus would have a straight radial course to the dentate line, while an external opening posterior to the same line would have a curved tract towards the posterior midline (Goodsall and Miles 1990).

Another classification that has withstood the test of time and technology is the Parks classification described by Sir Alan Parks in the 1970s. On the basis of the cryptoglandular theory, the Parks classification divides anal fistula into intersphincteric, transsphincteric, suprasphincteric and extrasphincteric (Parks et al. 1976). This classification guides subsequent surgical management. In intersphincteric and low transsphincteric fistulas where there is no or minimal involvement of the external sphincter muscles, respectively, a lay-open fistulotomy can be safely performed with excellent success rates. However, in situations where the amount of external sphincter muscle involvement is deemed considerable, as in high transsphincteric and suprasphincteric fistulas, a lay-open fistulotomy will result in considerable sphincter damage and could increase the risk of developing anal incontinence subsequently. Hence, numerous sphincter-saving procedures have been proposed to prevent this morbidity.

## 12.2 Technological Advancement in the Preoperative Assessment of Anal Fistula

As we continue to advocate surgical interventions based on the Goodsall rule and Parks classification, there remain instances whereby the fistulas may actually deviate from the norm. This could have detrimental effects when the severity of the fistulas was only ascertained intraoperatively. With the continual advancement in diagnostic radiology, it is now possible to garner imaging for depicting the anatomy of the anal fistula preoperatively. This would definitely aid in understanding the anatomy of the fistula, the planning of the surgery and preoperative counselling for the patients. Endoanal ultrasonography (EAUS) and magnetic resonance imaging (MRI) are two such modalities used in the assessment of anal fistula.

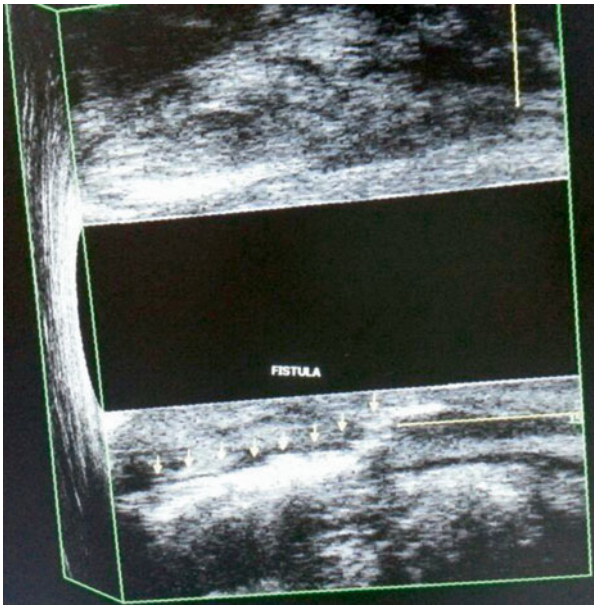


**Fig. 12.1** Endoanal ultrasonographic picture showing the course of the fistula with respect to the sphincter musculature

### 12.2.1 Endoanal Ultrasound (Fig. 12.1)

Endoanal ultrasound (EAUS), also known as anal endosonography, has been shown to be a cheap and accurate diagnostic modality that enables preoperative visualisation of the fistula tract (Nevler et al. 2013). One of its main advantages is the ability to delineate the anatomy of the fistula tract distinctly and to correlate its path with respect to the integrity and relation of the internal and external sphincters. The use of hydrogen peroxide coupled with the advent of 3-dimensional images also increase the accuracy of the test and help to better identify the location of the internal opening and determine the presence of any secondary fistula tracts (Kim and Park 2009). When used properly, the radiological findings correspond closely with the surgical findings, and the images provide a blueprint to plan the optimal surgical intervention.

As in all sonographic modalities, the main disadvantage lies in its heavy dependence on the competency of the operator. In addition, EAUS has a limited focal range whereby pathology beyond the anal sphincters complex may not be as clearly visualised.

### 12.2.2 Magnetic Resonance Imaging

The superior ability to discern soft tissue planes has resulted in magnetic resonance imaging (MRI) being used in various specialties. With a reported concordance rate of over 90 % with operative findings, MRI has slowly become a recognised modality in the preoperative assessment of recurrent and complex anal fistulas (Holzer et al. 2000). It is also able to evaluate the deeper surgical planes, underlying

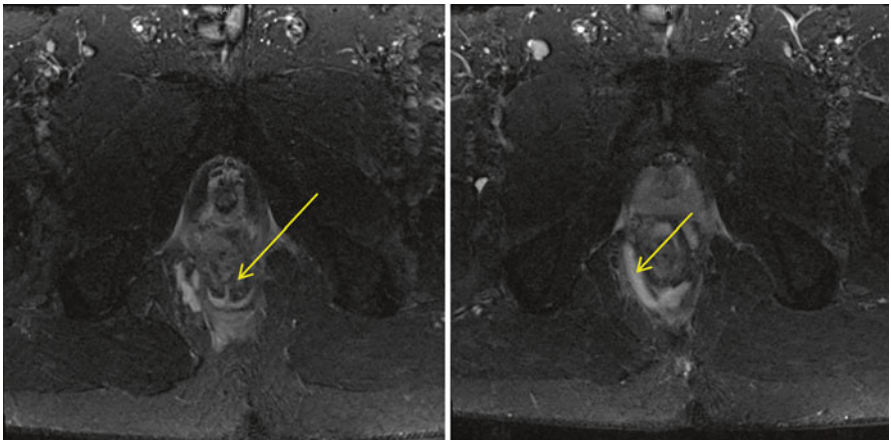

**Fig. 12.2** MRI images of the pelvis. Image on the *left* shows an intersphincteric fistula tract at the 6 o'clock position (*arrowed*), and image on the *right* shows a right ischiorectal abscess (*arrowed*), which is communicating with the fistula tract

pathologies and complex characteristics of the anal fistulas more accurately than EAUS (Fig. 12.2). The availability of the MRI, or the lack of it, and its significant cost are its main limitations.

## 12.3 Surgical Management for Anal Fistula: A Journey Through Time and Innovation

The principles of surgical management in anal fistulas are the eradication of sepsis, prevention of recurrence and preservation of continence. While numerous evolving techniques have sprung up over the years in the hope of replacing lay-open fistulotomy as the standard of care in the management of all anal fistulas, none has succeeded thus far. We hereby evaluate the various techniques that have been advocated for anal fistula over the past years.

### 12.3.1 Fistulotomy

Lay-open fistulotomy was first described by John Arderne, an English surgeon, in the fourteenth century. As the name implies, this technique essentially involves laying open the fistula tract after establishing the path of the fistula from the external opening to the internal opening. This would facilitate drainage of the perianal sepsis and enables the wound to heal by secondary intention. A recent study demonstrated a 3-year recurrence rate of as low as 7 % with this technique (Benjelloun et al. 2013). The key component of this technique involves curetting the fistula tract to eradicate any infected and unhealthy tissue. A variation of the technique involves

marsupialisation of the edges to prevent the skin from closing over the wound before healing from the wound bed, thereby reducing recurrence rates. This approach has been shown to be associated with faster wound healing and shorter duration of wound discharge (Ho et al. 1998).

Despite its high success rates, the risk of subsequent faecal incontinence increases if this technique is performed in fistulas with considerable involvement of the external anal sphincter or in patients with predisposing impaired anal continence. It has been reported that mild incontinence occurred in 9 % while severe incontinence is documented in up to 4 % of the patients (Stremitzer et al. 2011). This has a detrimental impact on the patients' quality of life. Thus, lay-open fistulotomy has gradually fallen out of favour in patients with high anal fistula if considerable amount of anal sphincter muscles would be divided (Mylonakis et al. 2001; Cavanaugh et al. 2002).

### 12.3.2 Seton

First described by Hippocrates, seton placement within the fistula tract, either loosely or tightly, has been around for a long time. It is often used either as a bridging procedure to fistulotomy or a single modality in high complex anal fistula to avoid upfront division of excessive amount of sphincter muscle (McCourtney and Finlay 1995; Memon et al. 2011). There are two ways to insert a seton – draining (loose) and cutting (tight). The primary aim of inserting a seton within the fistula tract is to enable drainage of the sepsis.

Although a draining seton effectively relieves the perianal sepsis, it is often not definitive. A subsequent procedure such as fistulotomy is typically performed when the seton has migrated more superficially. A recent meta-analysis actually highlighted a fistula recurrence rate of 3–5 %, depending on whether the anal sphincters were divided with placement of seton. The group that had their anal sphincters divided had slightly better outcomes. But the faecal incontinence rate was also significantly higher in the group that had their anal sphincter divided compared with those who only had seton without division of sphincters (25.2 % vs. 5.2 %) (Vial et al. 2010).

Conversely, when a cutting seton is used, one of the aims is to exteriorise a deep tract by inducing fibrosis superficial to the seton. This would gradually make the tract more superficial as the seton is tightened sequentially in intervals after its insertion. Apart from significant pain and discomfort arising from the rigidity of the seton coupled with the frequent tightening procedures, the reported incontinence rates are actually considerable in spite of its purported sphincter-sparing properties. The faecal incontinence rate of as high as 12 %, with almost 60 % of patients complaining of minor persistent loss of continence to flatus and fluid, has been reported (Ritchie et al. 2009). This complication is likely secondary to the disruption of the anal sphincters as the tightening process of the seton actually cuts through the sphincters gradually, and the ensuing fibrosis and scarring of the muscle fibres resulted in suboptimal function of the sphincters.

### 12.3.3 Mucosal Advancement Flap

This technique was first described for the repair of rectovaginal fistulas in 1902 which later extended to the treatment of complex anal fistulas. The two primary aims of this technique are to disrupt any communication of the tract with the anal canal and to completely remove the diseased and inflamed tissue from the anal mucosal surface (Elting 1912). A meta-analysis review of the success rate for anal fistula following mucosal advancement flap procedures revealed a recurrence rate from 7.0 to 51.7 %, while the wound healing time was reported to be 24.5 (±5.5) days. The incontinence rate was documented to be from 3.7 to 13.4 %. But as this technique is typically reserved for mainly the recurrent and/or complex high anal fistulas, one would expect their success rates to be less than first-line options such as fistulotomy.

One of the limitations precluding its widespread adoption is the technical difficulties in mastering this procedure. A thorough understanding of the anal anatomy and the underlying pathology is critical to maximise the success and minimise its complication rates (Golub et al. 1997; Leng and Jin 2012). To pursue a higher success rate for this technique, some surgeons have combined the mucosal advancement flap with the administration of platelet-rich plasma which is an autologous form of tissue glue. A 16.0 % recurrence rate after a median follow-up period of 27 months was reported which did not appear to improve the procedural outcome significantly (Göttgens et al. 2014).

### 12.3.4 Utilising Technology for Anal Fistula Treatment

The problems of the aforementioned techniques are apparent. Anal fistulas involving minimal sphincter muscles can be easily dealt with by the fistulotomy procedure. But none of the "traditional" methods have been deemed safe and effective in the treatment of high, complex and recurrent anal fistulas. With the continual advancement in science and technology, newer and innovative techniques have been introduced with the aim to improve the success rates following the treatment of this difficult condition while preserving the anal sphincter function.

#### 12.3.4.1 Fibrin Glue

The rationale of fibrin glue in anal fistula is the application of an adhesive substance into the fistula tract with the aim to facilitate its closure by laying down a fibrin network. If proven to be successful, this is an attractive, fast and non-invasive method for treating anal fistulas. In the initial years following its introduction in the 1990s, the overall closure rate reported could be as high as 85–100 % after single or multiple treatments (Sentovich 2001). However, longer-term follow-up studies revealed suboptimal results with one study reporting a healing rate of 39.1 % at 12 weeks post-operatively. Another randomised study highlighted a 27-month post-operative healing rate of only 21 % (Singer et al. 2005; Chung et al. 2009).

It is postulated that the high failure rates could be attributed to its inability to eradicate the infected and inflamed tissue and its failure to tackle complex fistulas

with secondary extensions. Coupled with the high failure and recurrence rates and the cost of the fibrin glue, this technique has largely fallen out of favour (Swinscoe et al. 2005).

#### 12.3.4.2 Fistula Plug

As we enter the new millennium, a bioprosthetic plug (Fig. 12.3) was introduced to address the liquid nature of the fibrin glue which was one of the postulated reasons for its poor outcome. These plugs are placed within the fistula tract, typically after perianal sepsis has subsided with the aid of a draining seton. The fistula plug is then sutured in place at the internal opening with the excess plug material being removed if it extrudes from the external opening (Fig. 12.4).

Initial interest was overwhelming following a prospectively conducted study which involved a cohort of 25 patients, where 15 patients were treated with plug and 10 with glue. A 6-month fistula closure success rate of 87 % was reported with plug

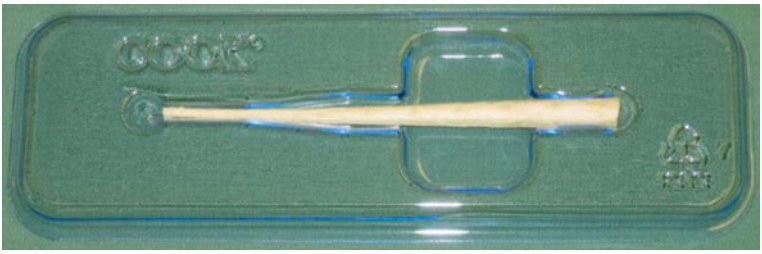

**Fig. 12.3** Anal fistula plug

**Fig. 12.4** Placement of the fistula plug within the fistula tract

treatment, compared to 40 % in those who had glue application (Johnson et al. 2006). Just like the fibrin glue, varying institutions and longer-term follow-up failed to replicate the success shared by the initial group. A retrospective review in an Australian centre reported a failure rate of 86.7 % at 59 weeks (Tan et al. 2013). A meta-analysis including three retrospective and two randomised studies also demonstrated that the incidence of recurrence for the anal fistula plug was 62.1 % compared to 47 % for conventional surgical approach (Pu et al. 2012).

A multicentre study of 126 patients over 5 years attempted to evaluate the risk factors that could predispose to failure of the fistula plug. While they concurred with the very low success rates, they found that anteriorly located fistula tends to have a lower chance of closure (12 %, hazard ratio = 2.98, confidence interval [CI] 1.01–8.78) (Blom et al. 2014). Other factors that have been reported as risk factors for failures included the extrusion of the fistula plug and its inability to deal with fistulas with secondary extensions.

#### 12.3.4.3 Video-Assisted Anal Fistula Treatment

Video-assisted anal fistula treatment (VAAFT) is one of the latest treatment modalities advocated for anal fistula. This technique which is first described by Meinero and Mori, combines the use of a small rigid endoscope inserted through the external opening to follow the tract until the internal opening (Fig. 12.5). This is then followed by electrocautery to fulgurate the fistula tract as the endoscope was slowly withdrawn. The internal opening is then closed either with a local mucosal flap or by stapler technique. One of the purported advantages of the scope includes its ability to exclude secondary fistula tracts or chronic deep abscesses.

**Fig. 12.5** Rigid fistuloscope being inserted into the fistula

This method theoretically discontinues the fistula tract with the anal mucosa and preserves the sphincter continuity by preventing further disruption to the sphincter integrity in high and complex anal fistulas. Meinero's study of 136 patients revealed an 87.1 % healing rate 1 year following the operation (Meinero and Mori 2011). The same study group later included incontinence scoring over a 24-month period for a total of 203 patients and found that none had a change in their continence ability (Meinero et al. 2014).

The promising results of this new technique have made it very attractive, but just like the fibrin glue and fistula plug techniques, this technique needs to be validated by other surgeons from numerous institutions to determine if similar outcomes can be achieved. The cost of the disposables required for this procedure is also a considerable limitation.

#### 12.3.4.4 Fistula Tract Laser Closure

The persistence of the fistula epithelium was deemed to be one of the main reasons for failure in fistula treatment. In recent years, the incorporation of laser technology to ablate the fistula tract has been attempted in the form of fistula tract laser closure (FiLaC).

A laser-emitting diode is threaded through the fistula tract, and the emission of a radial laser from the diode results in contraction of the tract around the laser fibre to induce fibrosis around the fistula tract in an attempt to obliterate it. This procedure is recommended as a follow-up procedure after perianal sepsis is alleviated with draining setons. It can also be combined with another procedure, like a mucosal advancement flap, to seal the internal opening.

Like the VAAFT technique, there are not much available data in the literature due to its novelty. However, from the limited experience with this modality, success rates of 71–82 % have been quoted with minimal adverse effects on incontinence (Giamundo et al. 2014; Wilhelm 2011).

### 12.3.5 Back to Basics?

Despite the prominence and keen interest in adopting technology and innovation in treating anal fistula, their outcomes have yet to reach levels comparable to conventional treatment modalities. Perhaps, success in fistula surgery may not necessarily lie with continual advancement in technology and innovation.

#### 12.3.5.1 Ligation of Intersphincteric Fistula Tract

A small group of surgeons opted to refocus on the basics of perianal anatomy and the pathological process of anal fistula rather than to continue to apply technology and innovation in this field. Rojanasakul and group described the ligation of intersphincteric fistula tract (LIFT) procedure which puts the emphasis back on the clear delineation of the anatomy and pathology of the anal fistula. It was postulated that the eradication of the infected crypt gland in the intersphincteric space is vital to the LIFT procedure (Fig. 12.6).

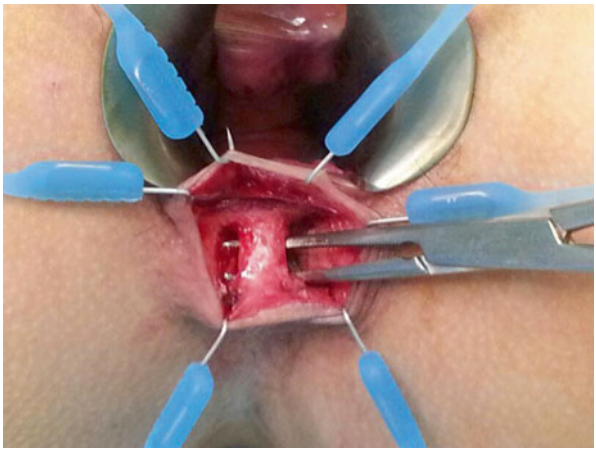

**Fig. 12.6** Intersphincteric fistula tract

The LIFT procedure became increasingly popular due to its minimal cost and the simplicity of the operation. The initial reported success rate for the LIFT procedure from Rojanasakul et al. was an astonishing 94.4 % (Rojanasakul et al. 2007). Subsequent studies from numerous worldwide institutions have demonstrated more modest success rates from 57 to 82.2 % (Shanwani et al. 2010; Liu et al. 2013; Bleier et al. 2010).

Another purported benefit of this procedure was the conversion of a transsphincteric fistula to an intersphincteric fistula (through the intersphincteric wound) when the procedure fails. This then enables a lay-open fistulotomy to be performed with minimal impact on the anal sphincter function (Yassin et al. 2013). Another controversy of the LIFT procedure was the role of seton prior to the operation. While there were some who advocated inserting a draining seton for 6–8 weeks prior to the LIFT procedure to relieve the sepsis and facilitate identification of the tract, others refute this theory and found that the presence of a seton actually increased the failure rate due to the postulation that the tissues following resolution of inflammation would be more scarred and ischaemic.

Although the initial reports on the LIFT procedure remain promising, we await more long-term data on the effectiveness of the operation before defining its role in the treatment of anal fistula. Some of the other questions that remain unanswered include its true impact of continence and the role of seton prior to the operation (Tan et al. 2011, 2012; Yassin et al. 2013).

#### 12.3.5.2 Combining LIFT with Technological Innovation

As the name implies, the BioLIFT procedure is a combination of the classical LIFT procedure with the placement of a biological material. These can include an anal fistula plug or a bioprosthetic graft in the intersphincteric space in the same setting.

Initial success rate was reported to be between 68.8 and 94.4 % with a recurrence rate of 5.6–31.3 % when coupled with an anal fistula plug (Cui et al. 2012). When LIFT is combined with the insertion of a bioprosthetic graft, initial success rates

were reported to be over 90 % (Ellis 2010). However, when this procedure was repeated in Australia, the success rate of the BioLIFT was comparable to the conventional LIFT procedure (Chew et al. 2013; Tan and Lee 2014). The role of biological material in the LIFT procedure remains controversial at this juncture.

## 12.4 Haemorrhoids

First described by ancient Egyptians on papyruses, the term "haemorrhoids" has been strictly used to describe the normal arteriovenous cushions or plexus in the submucosal layer of the anal canal that are held up by fibromuscular ligaments. However, in clinical practice, the same term is used to describe the condition when patients present with bleeding and/or prolapse.

After over twenty centuries since its first description, the management of haemorrhoidal conditions has surprisingly not changed much since the days of Hippocrates. Despite similar principles of management, technology has come into the fold recently in an attempt to improve the outcomes of haemorrhoidal treatment.

## 12.5 Treatment of Haemorrhoids: What Has Changed?

From the ancient methods of molten lead, management of haemorrhoid treatment has evolved with the aid of technology. Interestingly, the recurrence and persistence of haemorrhoidal condition have not improved much in spite of introduction of newer techniques. This is probably due to the underlying pathophysiology of the condition. Conservative management, where lifestyle, dietary and defecation habits are modified, still remains the mainstay in treating early haemorrhoidal disease.

## 12.6 Current "Standard" Procedures

### 12.6.1 Rubber Band Ligation

Rubber band ligation (RBL) is a convenient, quick and simple office procedure described and refined by Blaisdell and Barron. The main rationale was to strangulate the engorged haemorrhoidal plexus and allow necrosis, sloughing and scar formation to occur (Laisdell 1958). This technique is still frequently performed for grade I, grade II and selected grade III internal haemorrhoids. Studies have shown that up to 70 % of patients remain asymptomatic up to 10 years post RBL for grade II haemorrhoids (Lu et al. 2013). Minimal complications apart from mild to moderate discomfort are experienced.

However, the shortfall of this technique is that it is contraindicated in external haemorrhoids and is not effective in addressing all haemorrhoidal conditions, especially significant prolapse. Add onto the symptom recurrence rate of up to 30 %, other methods of treatment have been gradually introduced.

### 12.6.2 Excisional Haemorrhoidectomy (Open Milligan-Morgan and Closed Ferguson Techniques)

Haemorrhoidectomy involves the removal of the symptomatic haemorrhoidal tissues. It is said to be the most effective treatment for haemorrhoids that have failed conservative treatment. Patients with grade III or IV haemorrhoids or presenting with acute conditions such as thrombosis have been routinely offered excisional haemorrhoidectomy. In one study comparing excisional haemorrhoidectomy and RBL, excisional haemorrhoidectomy was able to achieve a higher rate of symptom remission than RBL (relative risk [RR] 1.68, 95 % CI 1.00–2.83) with fewer patients requiring retreatment (RR 0.20, 95 % CI 0.09–0.40) albeit with more post-operative pain (RR 1.94, 95 % CI 1.62–2.33) (Shanmugam et al. 2005). The two most commonly described techniques are the open Milligan-Morgan procedure and the closed Ferguson haemorrhoidectomy.

The main difference between the Milligan-Morgan technique and the Ferguson technique lies in the stitching up of the submucosal layer following excision of the haemorrhoidal plexus. The closed Ferguson haemorrhoidectomy technique has better reported outcomes in terms of post-operative incontinence compared to the open Milligan-Morgan technique (Jóhannsson et al. 2006). Differences in the post-operative pain and days taken for symptom remission vary from study to study, with no clear evidence favouring one over the other. Despite a common consensus on that aspect, one cannot ignore the fact that recovery from this technique is still more than 10 days.

### 12.6.3 Procedure for Prolapsed Haemorrhoids or Stapled Haemorrhoidopexy

Introduced in 1998, this technique involves the use of a circular stapling device used to excise redundant prolapsing or bulging anal mucosal tissue proximal to where the haemorrhoidal tissues are. This results in the tissue overlying the bulging haemorrhoids to be pulled more proximally and thereby reduces the blood flow through the haemorrhoidal plexus. At the same time, the procedure retracts the prolapsed haemorrhoids back into the anal canal.

Some of the reported benefits of this procedure over conventional haemorrhoidectomy include reduced post-operative pain (Senagore et al. 2004; Tjandra and Chan 2007), shorter hospital stay (Nisar et al. 2004; Hetzer et al. 2002), earlier recovery time and reduced operative duration. Some of the common post-operative complications of this procedure include bleeding, acute urinary retention, formation of stricture and fissures. There are also case reports of rectal perforation and chronic pain post stapled haemorrhoidopexy (Pescatori and Gagliardi 2008).

A meta-analysis comparing stapled haemorrhoidopexy to conventional haemorrhoidectomy revealed that even though stapled haemorrhoidopexy allows a shorter hospital stay, the recurrence of haemorrhoidal prolapse (OR 3.60, CI 1.24–10.49) and the need for a second procedure were more common in the

stapled haemorrhoidopexy group (OR 6.78, 95 % CI 2.00–23.00). Complication rates and cost were largely similar for both techniques (Jayaraman et al. 2006; Burch et al. 2009).

### 12.6.4 Transanal Haemorrhoidal Dearterialisation

In 1995, Morinaga incorporated the understanding of anatomy and pathophysiology of haemorrhoidal disease with the principles of minimally invasive and ultrasound technology to develop a novel non-excisional procedure for haemorrhoidal disease – the transanal haemorrhoidal dearterialisation (THD) (Morinaga et al. 1995). This technique involves the use of an anoscope, specially fitted with an ultrasound probe, to locate the distal rectal arterial branches. These are then ligated with stitches to reduce the blood flow within the haemorrhoidal plexus.

When first described, Morinaga reported that up to 96 % of patients had improvement in pain, 95 % for bleeding and 78 % for prolapse. This potential brought optimism to the advocates of minimally invasive surgery as the results suggest that more can be achieved by doing less, with less damage to the innate anatomy.

A subsequent systemic review of 17 articles involving almost 2000 patients revealed that the post-operative pain was only experienced by 18 % of patients with recurrence rate of between 4.7 and 9.0 % depending on the type of symptoms (Giordano et al. 2009). In view of lack of long-term prospective data, the HubBLe trial, a multicentred randomised control trial, is currently being conducted by a group in Leeds, United Kingdom, to compare the patient-reported symptom recurrence rate and cost-effectiveness between THD and RBL (Vial et al. 2010).

### 12.6.5 Emerging Technology

With the promising initial short-term data of THD, incorporation of a bipolar device to the anoscope to alleviate the technically more difficult placement of sutures has been attempted using the HET bipolar device (HET Systems, Northvale, NJ, USA). Initial short- and long-term outcomes were presented in 2012 revealing 86.7 % of patients with initial haematochezia from haemorrhoids having resolution of symptoms at 4 weeks and all patients having improvement in haemorrhoidal symptoms at an average follow-up time of 13.1 months (Kantsevoy 2013).

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