Anal fistula surgery is a commonly performed procedure. The diverse anatomy of anal fistulae and their proximity to anal sphincters make accurate preoperative diagnosis essential to avoid recurrence and fecal incontinence. Despite the fact that proper preoperative diagnosis can be reached in the majority of patients by simple clinical examination, endoanal ultrasound or magnetic resonance imaging, on many occasions, unexpected findings can be encountered during surgery that can make the operation difficult and correct decision-making crucial. In this article we discuss the difficulties and unexpected findings that can be encountered during anal fistula surgery and how to overcome them.

© 2011 Baishideng. All rights reserved.

Key words: Anal; Cryptogenic; Fistula; Surgery

Peer reviewers: Giuseppe Sica, MD, PhD, Department of Surgery, University Hospital Tor Vergata, Viale Oxford 81, Rome 00133, Italy; Takayuki Yamamoto, MD, Inflammatory Bowel Disease Center, Yokkaichi Social Insurance Hospital, 10-8 Hazuyamacho, Yokkaichi 510-0016, Japan

Abou-Zeid AA. Anal fistula: Intraoperative difficulties and unexpected findings. World J Gastroenterol 2011; 17(28): 3272-3276 Available from: URL: http://www.wjgnet.com/1007-9327/full/v17/i28/3272.htm DOI: http://dx.doi.org/10.3748/wjg.v17.i28.3272

INTRODUCTION

Anal fistula is a common disease that has long challenged surgeons’ skills. It is no wonder that Frederick Salmon, more than 170 years ago, was frustrated by the high recurrence rate after surgery for perianal fistula that he launched “The Infirmary for the Relief of the Poor afflicted with Fistula and other Diseases of the Rectum”. This later became St Marks Hospital, the famous British hospital for treating colorectal and small intestinal disorders.

Perianal fistula, if not treated properly will result in one of two terrible complications, recurrence or incontinence. Despite many preoperative investigations that can help to identify the correct anatomy of the fistula, one might face difficult or unexpected intraoperative findings that require wise decisions. Appropriate decisions in such circumstances have a significant impact on the outcome of surgery and the patient’s quality of life.

Difficulties in anal fistula surgery can be related to the anatomy of the fistula or the integrity of the anal canal. In this review, we will attempt to draw a roadmap to be followed if a difficult situation is encountered during anal fistula surgery.

INTERNAL OPENING COULD NOT BE IDENTIFIED

Proper identification of the internal opening is an integral part of fistula surgery if an unacceptable high recurrence rate is to be avoided. In our opinion, recurrence is inevitable if the correct internal opening is not identified and dealt with. This is simply because in such cases,
the original source of sepsis will not be eliminated.

Every effort should be made to localize the correct internal opening preoperatively. Besides clinical examination, many investigations can help in preoperative localization of the internal opening.[3-7] Unfortunately, none of these investigations are particularly accurate. Thus, it is not uncommon to operate on patients with unidentified or inaccurately identified internal openings. In such cases, accurate intraoperative localization is essential. This can be a simple task if external probing is easy and successful. Otherwise, we are dealing with a difficult internal opening which requires careful maneuvers for correct localization.

First, one should know where the internal opening is. The famous Goodsall's rule relates the radial location of the internal opening of the fistula to the position of the external opening. However, fallacies in Goodsall's rule have been reported and its overall accuracy is limited.[8,9]. Thus, it is unsafe to confidently rely on Goodsall's rule for identification of the internal opening. In our practice, we still use Goodsall's rule as a preliminary guide for localization of the internal opening. With regard to the cranio-caudal disposition of the internal opening along the anal canal, the vast majority of internal openings are located at the dentate line[10].

Palpation and internal probing should then be attempted starting at the expected site of the internal opening. Probing should be carried out gently in order to avoid the creation of a false internal opening. Sometimes, the internal opening can be palpated as a dimple, an elevation, a fibrous pit or soft granulation tissue pimple. In addition, a palpable trans-sphincteric track can guide to the site of the internal opening. Posterior horseshoe fistulae almost exclusively have their internal openings at the level of the dentate line at the 6 o’clock position.

Another method which has been used for localization of the internal opening is the injection of hydrogen peroxide[11] or methylene blue[12] into the external opening and observing the flow of air bubbles in the former or colored material in the latter from the internal opening. We personally prefer injection of air and have found this method useful on many occasions. This is because we believe that the injection of colored material will cause undesirable staining of tissues which will obscure vision of the opened track and its granulation tissue, both of which are important for confident laying open of the track to its very end into the anal mucosa, an essential step to avoid recurrence. We also believe that the effervescence of hydrogen peroxide is too much and unnecessary for localization of the internal opening.

Finally, if all methods fail to identify the internal opening, we then perform a preliminary fistulectomy. This is not a complete fistulectomy but it is a limited fistulectomy aimed at proper localization of the internal opening as a prerequisite for a successful lay open procedure. In a preliminary fistulectomy, the track is dissected short of the external sphincter, at which point, the track is gently pulled while the anal mucosa is carefully inspected. The track will pull on the offending pit, and the anal mucosa at this site will be indrawn. At this stage, the probe can be inserted confidently into the correct track, and the internal opening and fistula can be confidently laid open.

If after using all means, the internal opening is not identified, we prefer to abandon the procedure and to give the patient another chance of accurate assessment and investigations. Although we are confident that, at this stage, we are not curing the patient, we believe that this is better than harming the sphincters without major benefit.

THE FISTULOUS TRACK COULD NOT BE PROBED

Probing of the fistulous track is essential to perform the lay open operation. A fistulous track can be difficult to probe if it is narrow, obstructed, kinked or branched. Forceful probing in such cases will result in the creation of a false track or a false internal opening or both. This will very likely result in recurrence.

If external probing fails, it is advisable to try gentle internal probing starting at the site of a palpable or expected internal opening. If internal probing fails, one can lay open the track piecemeal until the whole track is eventually opened. We do not prefer this technique because inadequate hemostasis can obscure the track making further progression with the lay open procedure difficult. This is especially true when the track is deep, narrow or recurrent. Our preferred technique is preliminary fistulectomy, as mentioned in the previous section. In this situation, preliminary fistulectomy has many advantages. First, if failure of probing was due to the presence of kinks in the track, all such kinks are straightened and this, by itself, can make probing possible. Second, probing of the track is done under vision so that all stenotic segments in the track, if any, are probed with confidence and without fear of creating a false passage. Third, the site of the internal opening can be identified confidently by pulling on the mobilized track and observing dimpling in the anal mucosa as previously mentioned. Finally, during fistulectomy if dissection is performed in the wrong plane and the track is opened, granulation tissue will immediately be seen raising a red flag to warn the surgeon to return to the proper plane.

UNEXPECTED ANATOMY

We believe that the correct anatomy in the majority of perianal fistulae can be disclosed preoperatively.[13-15] However, occasionally, undiagnosed difficult anatomy is encountered during surgery. Special types of difficult fistulae which can be missed clinically only to be discovered during surgery are as follows: classic posterior horseshoe fistula with or without a blind supralevator track, intersphincteric fistula with high component, high arching trans-sphincteric fistula and anterior track with special proximity to the male urethra. These fistulae do not re-
quire specific treatment, however, they need expert experienced management. Anterior fistulae near the base of the scrotum can be very close to the bulbous urethra risking its injury during the procedure. We advise inserting a urethral catheter in such cases for better identification of the urethra. For high arching fistulae, one of the sphincter-saving procedures\(^\text{16-24}\) can be performed or otherwise a seton can be placed\(^\text{21,22}\) and the situation is reassessed with the patient awake. Placement of a seton will also allow the different treatment options to be discussed with the patient. Intersphincteric fistulae can reach high into the rectum entailing the use of a self-retaining anal retractor, special instruments that suit endoanal surgery, good suction and light.

**FISTULAE WITHOUT AN EXTERNAL OPENING**

The vast majority of anal fistulae are cryptogenic in origin\(^\text{23}\). This means that the fistula starts as an infection in one of the perianal glands that extends to drain itself in the perianal skin. A fistula without an external opening simply presents before external drainage occurs. This problem is uncommon and is not specifically discussed in the literature. In our experience, the majority of fistulae without an external opening are intersphincteric fistulae, however, as the pathogenesis implies, any type of cryptogenic fistula can present without an external opening.

Absence of an external opening is unlikely to be first discovered intraoperatively. However, because the location of the external opening is significantly related to the complexity of the fistula\(^\text{15}\), such fistulae are frequently underestimated and the presence of a fistula of significant magnitude might be discovered at operation. Thus, the main track may not be completely palpable, probing can be difficult or impossible and side tracks might be missed. Our own plan of management is as follows: First, we try to disclose the anatomy and complexity of the fistula by palpating the fistulous tracks to assess their number, extent and depth. Then we try to identify the internal opening and carry out internal probing. If this is successful, we proceed to lay open the track keeping the risk of incontinence and recurrence in mind, in view of the anatomy of the fistula and the status of the anal canal. If internal probing fails, we then perform a limited fistulectomy in which we mobilize a limited segment of the track that will allow proper handling and manipulation. We start the procedure by making a curvilinear incision incorporating the blind end of the fistulous track (the presumed site of external opening). This point is located by meticulous palpation. In inter-sphincteric fistulae, this point might be high in the rectum entailing the use of special instruments as previously mentioned. When a good segment of the track is dissected, it is opened transversely, probed and laid open as in the classic lay open operation. If probing fails, we proceed with complete fistulectomy until the whole track is excised (in intersphincteric fistula) or until we reach the external sphincter (in trans-sphincteric fistula) and then we proceed as mentioned previously in preliminary fistulectomy.

Absence of an external opening is particularly difficult in cases of classic posterior horseshoe fistulae. Internal probing and lay open of this track is not enough because it will only drain the trans-sphincteric component of the fistula and not the horseshoe component. Thus, in this type of fistula, we start by mobilizing the anal canal from the sacrum and coccyx, then we lay open the horseshoe track, possibly guided by a probe placed from the internal opening for correct identification of the horseshoe track and then eventually we lay open the trans-sphincteric track.

**SYNCHRONOUS FISTULA**

A synchronous fistula is a fistula which has a separate track and a separate internal opening and which exists synchronously with the original fistula. This is to be differentiated from a branching fistula in which all branches eventually open into a single internal opening. A synchronous fistula can have an external opening or it can be without an external opening.

Synchronous fistulae are generally uncommon. With personal experience of over 1300 fistulae, we encountered synchronous fistulae in nine patients (unpublished data). In two patients there were three synchronous fistulae.

Synchronous fistulae should be detected preoperatively. However, this is not always the case, especially if they are minute or when they lack external openings. They can even be missed at operation or may be considered to be a branch of the original fistula. In this latter case, the synchronous fistula track might be laid open or excised together with the original fistula, missing its internal opening which will result in recurrence. This dictates careful anal and perianal examination at the beginning of surgery.

Dealing with synchronous fistulae is not difficult and they do not require a special surgical technique. The problem is deciding whether to lay them open or not. If the anal canal is adequate and the fistulae are superficial, one can lay open all the synchronous fistulae without major risk of incontinence. However, if there is any doubt about the integrity of the anal canal or the anatomy of the fistulae, it is advised that only the primary or offending fistula be laid open keeping the other tracks either for staged procedures or other sphincter-saving operations.

**COMPROMISED ANAL CANAL**

Anal fistula surgery carries an inherent risk of fecal incontinence because part of the anal sphincter is essentially divided in the procedure. The incidence of fecal incontinence after surgery can reach up to 64%\(^\text{24-26}\). Postoperative incontinence is a function of the anatomy and complexity of the fistula on the one hand, and the adequacy of anal canal function on the other hand. Thus, laying open a high fistula with adequate anal canal function can result in a reduced degree of incontinence than
laying open a low fistula with a compromised anal canal. This implies that assessment of the anal canal integrity is very important in anal fistula surgery.

Assessment of the anal canal integrity is basically performed preoperatively, clinically in the majority of situations and by anorectal physiology testing in certain selected patients\(^{28}\). However, due to the difficulty of anal examination while the patient is awake, it is not uncommon to encounter unexpected intraoperative findings of compromised anal canal. Patients at risk are female patients, patients with previous anal surgery, patients who had previous proctectomy or extensive colectomy, patients with chronic diarrheal states, anterior fistulae, high anging trans-sphincteric fistulae, supra-sphincteric fistulae and fistulae with high internal openings.

Generally speaking, one should never divide the sphincter if there is any doubt about the integrity of the anal canal or the anatomy of the fistula. In this situation, it is better to abandon the procedure and refer the patient to an expert center where a sphincter-saving procedure can be performed or placement of a seton. We usually place a draining seton rather than a cutting seton as the latter has been shown to result in incontinence and recurrence\(^{29,30}\). The seton allows for better assessment of the anal canal while the patient is awake. The patient then has one of three options depending on the relative risk of incontinence: If there is a high risk of incontinence, the patient can live with the seton in place permanently to drain the fistula track, or he can have one of the sphincter-saving procedures risking higher recurrence. If the risk of incontinence is low, then the patient can have the classic lay open operation that has a high chance of curing the fistula. If the operation results in a degree of incontinence, the patient still has the option of a sphincter repair at a later date.

Many sphincter-saving procedures are available for fistula patients, however, the results in terms of fistula recurrence are always inferior to the classic lay open operation. Moreover, the risk of incontinence is not completely eliminated. Injection of a mixture of fibrinogen and thrombin into the fistulous track was first described by Hjortrup in the early 1990s aimed at the formation of a fibrin plug that would obliterate the track and cure the fistula\(^{31}\). The author reported healing in half of the patients. More recent studies have reported poorer results\(^{29,30}\). We believe that the high recurrence rate after fibrin glue injection is because the glue will never fill a complex track, a kinked track, a narrow track or a long track. It can also be extruded from the track after successful injection. The Surgisys fistula plug has been introduced to avoid these drawbacks. A healing rate as low as 13.9% has been reported\(^{32}\) with the majority of studies reporting a healing rate around 40%\(^{33,34}\). We believe Surgisys is only suitable for short wide fistula tracks. A mucosal advancement flap depends on obliterating the internal opening by advancing a mucosal flap from the anorectum. Recurrence has been reported in up to two thirds of patients, with slightly better results when a mucosal-mucosal flap is used rather than a pure mucosal flap\(^{35,36}\).

Our personal experience with mucosal advancement is disappointing. Recurrence is probably caused by infection in one or more of the stitches holding the flap. This is very likely in view of the septic medium in which the flap resides.

**FISTULA IN INFLAMMATORY BOWEL DISEASE**

The last point we are going to discuss is fistula in inflammatory bowel disease (IBD). Basically, this should be a preoperative diagnosis. However, fistula in a patient with IBD may only be discovered intraoperatively when perianal disease is the first presentation in the patient. This is especially true in places where IBD is uncommon. Fistulae commonly occur in patients with Crohn’s disease but can also be seen in ulcerative colitis. Classic and aggressive surgery in these patients will not cure the fistula but will very likely result in significant incontinence. The procedure in this situation is to take a frozen section biopsy if this is available or a biopsy for paraffin section examination. If IBD is confirmed, minimum action should be taken such as drainage of an abscess or placement of a seton to drain the fistulous track. Attention should then be directed to treatment of the original disease.

**REFERENCES**

1. Poon CM, Ho-Yin MC, Li RS, Leong HT. Recurrence pattern of fistula-in-ano in a Chinese population. J Gastrointestin Liver Dis 2008; 17: 53-57
2. Sainio P, Husa A. Fistula-in-ano. Clinical features and long-term results of surgery in 199 adults. Acta Chir Scand 1985; 151: 169-176
3. Kim Y, Park YJ. Three-dimensional endoanal ultrasonographic assessment of an anal fistula with and without H(2)O(2) enhancement. World J Gastroenterol 2009; 15: 4810-4815
4. Pascual Miguelánez I, García-Olmo D, Martínez-Puente MC, Pascual Montero JA. Is routine endoanal ultrasound useful in anal fistulas? Rev Esp Enferm Dig 2005; 97: 323-327
5. Navarro-Luna A, García-Domingo ML, Rius-Macias J, Marc-Molina C. Ultrasound study of anal fistulas with hydrogen peroxide enhancement. Dis Colon Rectum 2004; 47: 108-114
6. Joyce M, Veniero JC, Kiran RP. Magnetic resonance imaging in the management of anal fistula and anorectal sepsis. Clin Colon Rectal Surg 2008; 21: 213-219
7. Gustafsson UM, Kahvecioglu B, Aström G, Ahlström H, Graf W. Endoanal ultrasound or magnetic resonance imaging for preoperative assessment of an anal fistula: a comparative study. Colorectal Dis 2001; 3: 189-197
8. Ciocco WC, Reilly JC. Challenging the predictive accuracy of Goodsall’s rule for anal fistulas. Dis Colon Rectum 1992; 35: 537-542
9. Gunawardhana PA, Deen KL. Comparison of hydrogen peroxide instillation with Goodsall’s rule for fistula-in-ano. ANZ J Surg 2001; 71: 472-474
10. Kuypers JH. Diagnosis and treatment of fistula-in-ano. Neeli J Surg 1982; 34: 147-152
11. Glen DL. Use of hydrogen peroxide to identify internal opening of anal fistula and perianal abscess. Aust N Z J Surg 1986; 56: 433-435
12. Gonzalez-Ruiz C, Kaiser AM, Vukasin P, Beart RW, Ortega AE. Intraoperative physical diagnosis in the management of anal fistula. Am Surg 2006; 72: 11-15
