State of the art

Anal sphincter injuries in daily surgical practice - diagnosis and treatment

MAŁGORZATA KOŁODZIEJCZAK[1], IWONA SUDOŁ-SZOPINSKA[1,2,3]

[1]*Department of General Surgery, Proctology Unit, Solec Hospital, Warsaw, Poland*
[2,3]*Department of Radiology, Institute of Rheumathology, and Department of Diagnostic Imaging, Warsaw Medical University, Poland*

Abstract: According to statistical data, the most common anal sphincter injuries have obstetric aetiology (obstetric anal sphincter defect) or are of iatrogenic nature (fissurectomy, fistulectomy). Apart from perineal repair, including third- or fourth-degree injuries, performed directly after childbirth, the majority of such defects are treated in the course of scheduled procedures. Acute anal injuries resulting from sexual abuse and anal rape, foreign bodies and accidental injuries (e.g. by explosions, impalements, car accidents, etc.) constitute a separate diagnostic and therapeutic problem. Contrary to scheduled procedures, acute anal sphincter injuries are frequently treated in clinics that do not possess appropriate diagnostic base and experience in anal sphincter repair. The article presents the principles of diagnosis and management of acute anal sphincter injuries. The patient is always hospitalised and in the majority of cases, undergoes a surgery. The diagnostic process encompasses: interview, general physical and anorectal examinations, which frequently have to be conducted under anaesthesia, as well as basic laboratory tests: blood group, complete blood count, electrolytes, coagulation parameters and urinalysis. Additional diagnostic examinations include: abdominal x-ray, abdominal ultrasound and, if possible, transrectal ultrasound. The best functional effects are obtained if the muscles are sutured directly after the injury. If the sphincter defect is extensive, or the patient's condition is severe, or if the injury concerns multiple organs, a stoma should be performed. Similarly, if the surgeon has no experience in anorectal procedures, a stoma should be performed and the patient should be referred to a clinic with greater experience in coloproctology. The management in the case of scheduled sphincteroplasty is different. It should be preceded by functional and imaging diagnostic examinations.

Key words: Anorectal trauma; Diagnostics; Management; Overlapping sphincteroplasty.

INTRODUCTION

The most common causes for anal sphincter damage are obstetric[1-3] (Figures 1A, 1B) and iatrogenic injuries (fissurectomy, fistulectomy) (Figures 2A, 2B). In daily surgical practice, anorectal trauma is a rare pathology that usually results from sexual abuse and anal rape, foreign bodies and accidental injuries (e.g. by explosions, impalements, car accidents, etc.)[4] (Figure 3). The last two are also associated with injuries to other organs, such as: urethra, urinary bladder, vagina or pubic bone. Rarely, anal sphincter defects may result from swallowed foreign bodies, such as bone pieces or glass. Isolated anal damage results from a fall on sharp objects or are caused by various machines used e.g. on agricultural farms. Acute sphincter traumas are usually managed in surgical wards that do not have experience in coloproctology. Scheduled sphincter repair procedures, on the other hand, are performed in coloproctological centres. The article presents the principles of diagnostic and therapeutic management in acute anal sphincter trauma, presence of a foreign body in the rectum and planned repair of sphincter muscles.

DIAGNOSTIC AND TREATMENT

The general condition of a patient with anal defect may be different: good in the case of mild, isolated injury, or severe, including shock, in the case of extensive anal injury concomitant with damage to other pelvic structures and abdominal organs. Due to its rich innervation, the perineal region is a "shock-prone" area. Therefore, initially, it is difficult to assess whether the patient is in shock due to pain or haemorrhage. Analgesic medicines should be administered instantly. Moreover, examination by palpation should be conducted (see below) and vital signs should be monitored.

Diagnostics

The diagnostic process in a patient with acute anal injury encompasses: interview, general physical and anorectal examinations which frequently have to be conducted under anaesthesia. Additional diagnostic examinations should also be performed.

Interview

In order to reduce the level of psychological stress, privacy is essential during the interview, particularly when it is suspected that the damage was caused in the course of sexual activities or sexual abuse. Furthermore, embarrassed patients may conceal the circumstances in which the injury was sustained, which hinders diagnosis and treatment. Medical documentation should include: time of damage

Figure 1A. – High-grade obstetric damage to the sphincters.

Figure 1B. – High-grade obstetric damage to the sphincters.

Figure 2A. – Anal sphincter damage following fistula surgery.

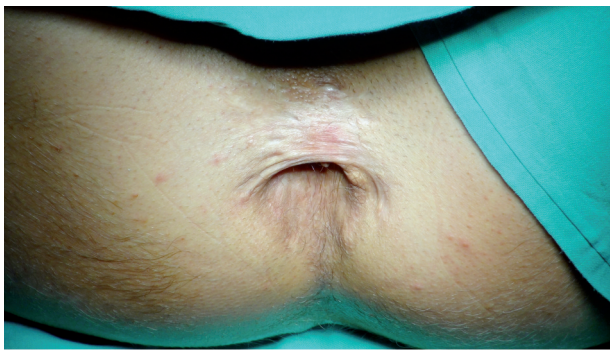

Figure 3. – Deformed anal canal in a patient after traffic accident (damage to multiple organs including sphincters).

(hour), time after which the patient reported to hospital and description of the circumstances in which the injury was sustained. The patient usually complains about pain in the anus and perineum as well as bleeding. The patients should be asked whether they passed stool or urine after the injury and whether there were traces of blood.

Physical examination

The level of consciousness as well as verbal and logical contact is assessed. The blood pressure and heart rate should be taken. If there is a suspicion that the patient may be intoxicated, this should be confirmed (if possible) with the blood alcohol test and the result should be included in the documentation. The abdomen should be examined by palpation. Additionally, a catheter should be inserted into the urinary bladder and urine should be checked for the presence of blood.

Anorectal examination

Anorectal examination consists of visual inspection of the anus and digital rectal examination. During visual inspection, one should assess the perianal region in terms of possible wounds, presence of blood or stool. So-called "anal sealing" are assessed (gaping anus usually attests to a severe damage to the sphincter muscles) (Figures 4). Subsequently, if possible, digital rectal examination should be conducted in Sims' position (sometimes pain prevents rectal examination). This examination enables the assessment of passive tone of the sphincters (which indirectly indicates the function of the internal anal sphincter) and subsequently, active tone during sphincter contraction (which indicates the function of the external anal sphincter and puborectalis muscle). The rectal contents (stool, blood, foreign body) should also be assessed. If possible, an endoscope should be inserted to the rectum (anoscope, rectoscope). Sometimes, it is necessary to examine the patient under anaesthesia.

Additional examinations

The fundamental examinations include: blood group, CBC, electrolytes, coagulation parameters and abdominal x-ray in a standing position or, if the patient's condition is severe, in a supine position as well as abdominal ultrasound. If a foreign body in the rectum is suspected, radiological examinations should be performed prior to the digital rectal examination. This particularly refers to the cases in which it is suspected that a sharp object was inserted into the rectum which might injure the physician performing the examination. If the hospital has such a possibility, performing anorectal endosonography – a transrectal ultrasound examination performed with a dedicated rectal transducer – may be very helpful.

Treatment

The best results of sphincter injury treatment are obtained when the repair procedure is performed directly after sustaining damage, i.e. not later than 24 hours after the injury, in a centre that has experience in anal reconstruction surgeries. The functional effects of delayed, scheduled repairs are considerably worse. Nevertheless, they seem to be a better alternative if the centre lacks experience.

Emergency sphincter repair

In the case of an isolated sphincter injury and good overall condition of the patient, emergency sphincteroplasty

Figure 2B. – Anal sphincter damage following fistula surgery.

Figure 4. – "Gaping anus" resulting from a considerable iatrogenic injury of the sphincters.

should be attempted. If the muscle is partially damaged, it is sutured by "end-to-end" technique and all crushed tissues are removed. In the case of doubts whether or not a given tissue is a muscle, one may apply electric stimulus that causes muscle contraction. A partial injury may be managed by single mattress stitches without mobilising the ends. If the entire thickness of the sphincters is damaged, it may be attempted to mobilise the muscle stumps and apply "overlapping" stitches (Figures 5A, 5B, 5C). Subsequently, anoderma and skin are sutured. Approximately 0.5 cm of the skin in the wound circumference should be left unsutured since this enables its drainage. If the wound crosses the ischiorectal fossa, an exceptionally thorough haemostasis should be performed (frequently, there is heavy bleeding from the ischiorectal fossa). A practical way to visualise the bleeding vessel in the ischiorectal fossa is to insert an endoscope which is superior to retractors in visualising deep wounds. The ischiorectal fossa heals by secondary intention with placed setons. Perineal wounds should always be thoroughly rinsed with hydrogen peroxide and should never be tightly stitched.

Indications for stoma

There is no consensus about indications for colostomy.[4] The decision to perform it is conditioned by several factors, such as: patient's overall condition, time that lapsed since the injury, the degree to which the rectum is filled with faeces and range of damage. If the condition of the patient is severe, the duration of the surgery should be reduced as much as possible – only essential, life-saving procedures should be performed, i.e. managing damaged organs and introducing a stoma. Optimal time for performing sphincteroplasty is 6 hours from the moment of sustaining injury. If over a dozen hours lapsed since the injury and perineal infection is suspected, it is always safer to perform a stoma. Experience of a surgeon in managing such injuries is also significant. If the surgeon on duty has no experience in anorectal procedures, stoma should be performed and the patient should be referred to a clinic with greater experience in coloproctology.

If damage to other organs is suspected, exploratory laparotomy should be conducted nearly always. A stoma should be performed in almost each case of extensive sphincter damage as well as in situations when repair is impossible due to technical reasons and when anal sphincter injury is accompanied by damage to other organs. An antibiotic therapy is always implemented.

Abandoning sphincteroplasty

– if the condition of the patient is grave: the duration of the surgery should be maximally reduced to include only essential, life-saving procedures, i.e. managing damaged organs and introducing a stoma;

– in extensive sphincter damage when repair is impossible due to technical reasons. The wound should be debrided and drained extensively. A stoma should be performed;

– when the surgeon lacks experience in managing such injuries.

Scheduled sphincteroplasty

A scheduled sphincteroplasty should be conducted in a coloproctological centre after the wound has completely healed, which usually occurs after min. 4-6 months following the injury. Theoretically, only injuries that do not exceed 1/3 of the muscle circumference are qualified to the repair procedure. However, in the authors' individual practice, repair attempts are sometimes undertaken when the damage is more extensive. In these cases, the patients always need a previously performed stoma.

Whereas emergency sphincter suturing is performed without prior functional diagnostics, the initial sphincter function should always be examined prior to qualifying the patient to a planned sphincteroplasty. This is essential since delayed reconstruction surgeries are not always effective and by properly documenting the extensiveness of damage, subsequent disappointment or even possible legal claims may be avoided. Therefore, the following should be conducted:

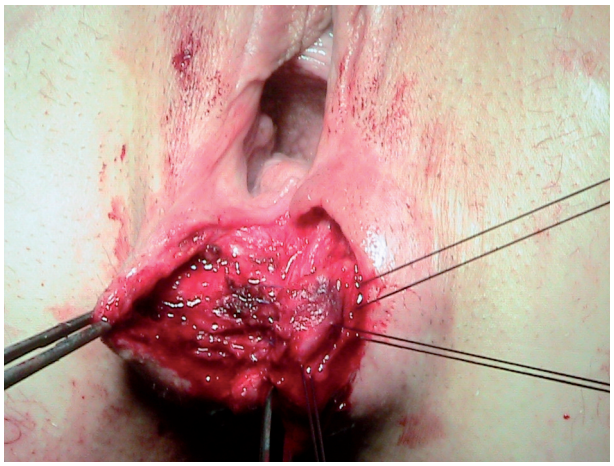

Figure 5A. – Mattress stitches.

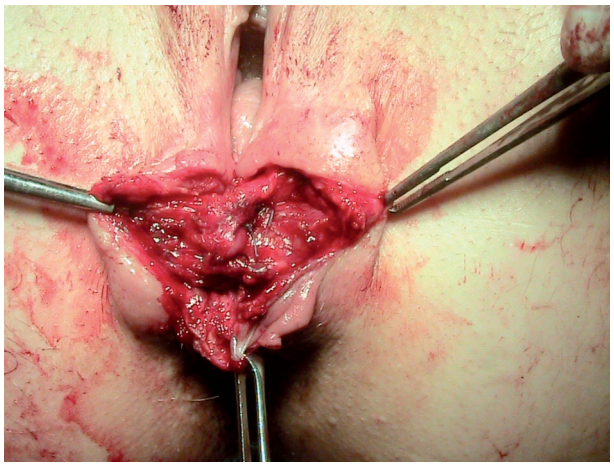

Figure 5C. – Sutured muscles.

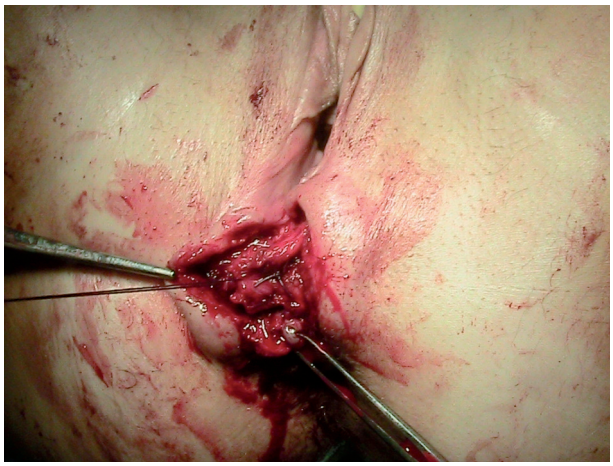

Figure 5B. – Stitch that brings the muscle closer to the wound bed.

a. anorectal examination and assessment of sphincter sufficiency according to an objective incontinence scale (e.g. Wexner's scale).

b. additional examinations:

– anorectal manometry

– anorectal endosonography or sphincter magnetic resonance imaging.

Anorectal manometry is an examination which allows for an indirect assessment of sphincteric function and sensory anorectal reactions. The basic parameters measured during the so-called static manometry include: resting and squeeze pressure in the anal canal, anal canal length, length of the increased pressure area, functional length of the internal anal sphincter as well as reflexes that are essential for, so-called, sensory functions of the anal canal and rectum, i.e. Gowers' recto-anal inhibitory reflex and reactional contractile reflex of the internal anal sphincter.[5] However, anorectal manometry does not enable to determine the cause of damage (mechanical or neurogenic). In order to specify the size and localisation of muscle defect, dynamic manometry may be applied. It allows for measuring pressure in a balloon in the rectum by means of continuous measurements and visualising these values in the form of a spatial figure. The difference between the volume of the obtained figure in the examined patient and the volume of so-called "ideal patient" is expressed in percentage and is called sphincter radial asymmetry. It allows for the localisation of the site of damage in approximation.[5]

Anorectal endosonography constitutes a supplementation of functional assessment and provides a morphological picture of the sphincters. In sphincter damage, the examination is performed to assess: the localisation of the injury with the specification of the damaged muscle (internal sphincter, external sphincter or puborectalis muscle), range of muscle defect (defect of more than 30% forces the operator to consider a protective stoma and sphincteric defect of more than 50% renders the repair surgery practically ineffective). The remaining muscle mass needed for reconstruction is assessed. The examination is performed both to qualify the patient to the procedure and to assess the efficacy of the surgery (Figures 6A, 6B, 6C, 6D).

Magnetic resonance with the use of a torso/pelvic coil or endoanal coil is rarely performed in sphincter injury diagnosis. It usually takes place in centres that do not possess endosonography or when endosonographic image is ambiguous. In the authors' own practice, MRI was performed only once when following endosonography, damage to the branch of the puborectalis muscle was suspected in a woman after a brutal rape. MRI image confirmed partial damage to the puborectalis muscle with coexistent injuries of the internal and external sphincters.

The findings of additional examinations need to be included in the documentation due to medical and legal reasons.

Similarly to emergency surgery, the scheduled procedure is conducted with the use of "overlapping" or "end-to-end" techniques. Overlapping sphincteroplasty was thoroughly described by Slade in 1977.[6] The long-term effects of planned repair surgeries are not always satisfactory but the published data related to their effectiveness are divergent.[7,8] Some authors estimate the effectiveness of such procedures at 50%,[9] others quote very high effectiveness rates.[10] Probably the reason for such discrepancies is non-uniform material of analysed patients. Next to mild injuries to the sphincters, the studies also included extensive sphincteric injuries and the other way round.

In nearly each case, surgical treatment should be followed by conservative therapy. Conservative treatment encompasses appropriate diet (avoiding foods that cause diarrhoea, diet thickening) and pharmacological therapy. Exercising sphincter muscles, frequently with the use of the biofeedback method, is also recommended. The biofeedback method uses biological feedback (visual or auditory control of the patient over contraction strength of the sphincters while exercising). The possibility to observe the reactions of the device to muscle contractions enables the patients to acquire and strengthen the ability to adequately flex and relax the muscles and the observed improvement motivates them to further exercises.

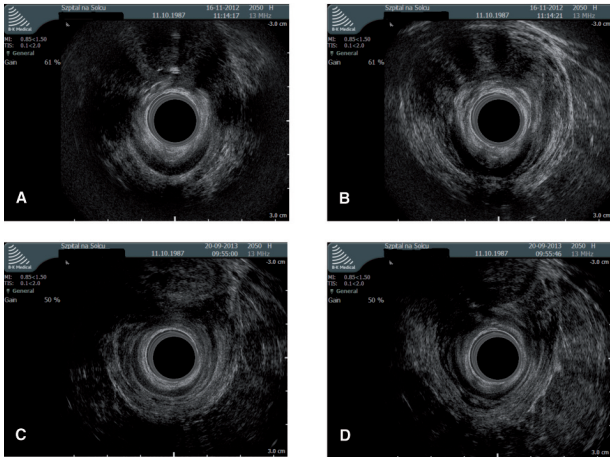

Figure 6. – Endosonographic examination of the obstetric injury of the anterior circumference of the internal and external sphincters in mid (A,C) and high (B,D) anal canal, before repair (A,B) and after sphincteroplasty (C,D) showing restored continuity of the muscles.

If defects are extensive and do not qualify to the procedure of suturing the sphincters and if the performed procedures mentioned above are ineffective, alternative surgeries should be considered, such as dynamic graciloplasty[11,12] or implantation of an artificial bowel sphincter - a hydraulic prosthesis, ABS.[13,14] The less invasive methods include: transrectal sacral nerve stimulation (SNS),[15,16] radiofrequency anal remodelling (RFAR) - Secca procedure or injecting collagen, silicone-based material, carbon microspheres and autologous fat into the sphincteric region.[17] None of these methods, however, produce long-term effects. Mixed injuries, i.e. structural defects with neurogenic component, are particularly problematic and do not have a favourable prognosis. The presence of neurogenic component may render the treatment ineffective even if the defect qualifies to sphincteroplasty.

Sphincteric injuries may also be caused by the presence of foreign bodies introduced to the anus. Sphincter damage results from: a: stretching (damaging the internal sphincter); b: direct injury by a foreign body (e.g. glass); c: movement of a foreign body, which leads to perforation or injury to the wall of the anus and rectum.[4] It is essential to take a detailed history from such a patient. Information concerning the circumstances in which the object was introduced into the rectum should be acquired. Foreign bodies are usually inserted during sexual activities. The patient frequently reports to the physician a day after sustaining damage and sometimes, due to intoxication, he or she does not remember the circumstances of the incident. If the patient does not complain about severe pain in the anus, no peritoneal symptoms are observed and the patient is in a good overall condition, anorectal examination may take place without anaesthesia in the left lateral position, during which the object may be retrieved from the anus. The knee-elbow position should be avoided since due to the force of gravity, the

foreign body may move away from the anal opening. Similarly to anal damage, anorectal examination should be preceded with abdominal x-ray, which facilitates localising the foreign body and helps determine its morphology and type. After the first unsuccessful attempt to retrieve the foreign body, the subsequent attempts should be made under anaesthesia in the operating theatre.[18] In some cases, laparotomy may be necessary. Following each removal of the foreign body, the rectal mucous membrane should be assessed via an endoscope. The patient should be monitored in hospital for at least 24 hours.

CONCLUSION

Despite the advancement of anal and rectal surgery, the most effective method of treating sphincteric injuries is primary surgical repair. The effectiveness of the procedure depends on experience of the surgical team, which is associated with proper wound debridement, correct suturing of the sphincters and factors that do not depend on the surgeon, such as: time that lapsed from sustaining the injury to sphincter repair procedure, extensiveness of damage, co-existence of damage to other organs, general condition of the patient and the degree to which the rectum is filled with stool. Scheduled sphincter repairs are performed in coloproctological centres and are preceded by functional and imaging examinations. Nevertheless, their long-term effects are worse than those of emergency procedures. Surgical procedures should be followed by conservative treatment, including biofeedback therapy or electrostimulation of the sphincter muscles.

REFERENCES

1. Abramowitz L, Sobhani I, Ganansia R, Vuagnat A, Benifla JL, Darai E, Madelemat P, Mignon M.: Are sphincter defects the cause of anal incontinence after vaginal delivery? Results of a prospective study. Dis Colon Rectum 2000; 43: 590-598.
2. Groutz A, Fait G, Lessing JB, David MP, Wolman I, Jaffa A, Gordon D.: Incidence and obstetric risk factors of postpartum anal incontinence. Scand J Gastroenterol 1999; 3: 315-318.
3. Lam TC, Kennedy ML, Chen FC, Lubowski DZ, Talley NL: Prevalence of faecal incontinence: obstetric and constipation-related risk factors; a population based study. Colorectal Diseases 1999, 1: 197-203.
4. Godeberge B. Anorectal trauma. In: Anorectal diseases, Godeberge P (ed). Editions Flammarion SA 2008, Paris, pp: 235-240.
5. Fynes MM Behan M, O'Herlihy C, O'Connell PR. Anal vector volume analysis complements endoanal ultrasonographic assessment of postpartum anal sphincter injury. Br J Surg 2000; 87: 1209-1214.
6. Slade M.S., Goldberg S.M., Schottler J.L. et al.: Sphincteroplasty for acquired anal incontinence. Dis. Colon Rectum 1977; 20: 33-35.
7. Malouf AJ et al.: Long-term results of overlapping anterior anal-sphincter repair for obstetric trauma. Lancet 2000; 22; 355 (9200): 260-5.
8. Zorcolo L, Covotta L, Bartolo DC: Outcome of anterior sphincter repair for obstetric injury: comparison of early and late results. Dis Colon Rectum 2005; 48 (3): 524-31.
9. Nikiteas N et al.: Audit of sphinster repair: factors associated with poor outcome. Dis Colon Rectum 1996; 39: 1164-1170.
10. Yoshioka K, Keighley MRB: The position of the patent does not adversely influence the results of the most clinically important measurement of anorectal function. Int J Colorect Dis 1995; 10: 47-48.
11. Chapman A.E., Geerdes B., Hewett P. et al.: Systematic review of dynamic graciloplasty in the treatment of faecal incontinence. Br. J. Surg. 2002; 89: 138-153.
12. Baeten C.G., Bailey H.R., Bakka A. et al.: Safety and efficacy of dynamic graciloplasty for fecal incontinence: report of a prospective, multicenter trial. Dynamic Graciloplasty Therapy Study Group. Dis. Colon Rectum 2000; 43: 743-751.
13. Lehur P.A., Michot F., Denis P. et al.: Results of artificial sphincter in severe anal incontinence. Report of 14 consecutive implantations. Dis. Colon Rectum 1996; 39: 1352-1355.
14. Lehur P.A., Zerbib F., Neunlist M. et al.: Comparison of quality of life and anorectal function after artificial sphincter implantation. Dis. Colon Rectum 2002; 45: 508-513.
15. Matzel K.E., Stadelmaier U., Bittorf B. et al.: Bilateral sacral spinal nerve stimulation for fecal incontinence after low anterior rectum resection. Int. J. Colorectal Dis. 2002; 17: 430-434.
16. Rosen H.R., Urbarz C., Holzer B. et al.: Sacral nerve stimulation as a treatment for fecal incontinence. Gastroenterology 2001; 121: 536-541.
17. Davis K., Kumar D.: Clinical evaluation of injectable anal sphincter bulking agent (Durasphere) in management of patients with persistent faecal incontinence secondary to internal anal sphincter defect. Dis. Colon Rectum 2002; 45.
18. Desai B. Visual diagnosis: Rectal foreign body: Aprimer for emergency physicians. Int J Emerg Med. 2011; 4: 73.

Correspondence to:

Małgorzata Kołodziejczak, MD
Solec Hospital, Warsaw, 00-382, St. Solec 93.
sudolszopinska@gmail.com