

Sphincter Repair for Fecal Incontinence

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Twenty-seven patients who had sphincter repair by one surgeon over the last ten years were reviewed. Previous surgery, childbirth, and perineal trauma were the most common causes. Twelve patients had been treated previously using an anal continence device (N = 6), postanal repair (N = 5), and rectopexy (N = 1). A covering colostomy was used in ten patients. At the initial operation only 7 patients were rendered completely continent, 13 others were improved, but results were poor in the other 7. Four of the 7 patients were rendered completely continent after secondary operations. Maximum anal pressure and maximum squeeze pressure did not change significantly after surgery; however, preoperative maximum squeeze pressure in patients who achieved complete continence was significantly greater than in those that did not. Poor results usually were associated with severe obstetric trauma. [Key words: Sphincter repair; Fecal incontinence; Maximum anal pressure; Maximum squeeze pressure]

FECAL INCONTINENCE sometimes occurs as a result of division of the anal sphincter due to traumatic injury, surgical mishap, or obstetric tears extending into the anal canal.¹ Functional impairment depends on the degree of muscle disruption and the extent of pelvic floor neuropathy. If the external sphincter has been divided completely, some form of sphincter repair usually is performed. The principle of sphincter repair is simply to reconstruct the anal canal by preserving anal mucosa and repairing the torn sphincter.² The location of the injury

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determines the degree of functional impairment, particularly in women, because anterior defects are associated with limited muscular support in the area between the anus and vagina.³ The best results have been obtained in young patients with traumatic sphincter injury, some despite severe degrees of trauma; the remaining external sphincter muscle is healthy and functions normally.⁴ Some authors recommend creating a temporary colostomy to protect the repair^{2,5}; others have not found this to be necessary.^{6,7}

The authors reviewed 27 patients who have had a sphincter repair over the last ten years.

Patients and Methods

Twenty-seven patients had sphincter repair for fecal incontinence from 1976 to 1986. There were 13 men and 14 women. Median age was 34 years (range, 17 to 81 years).

The symptoms, clinical findings, and follow-up of patients were recorded on specific data sheets. Preoperative anal pressure studies were undertaken in most patients and were studied postoperatively in 17 patients.

Anal pressures were measured in the left lateral position after rectal examination using a closed, water-filled balloon probe attached to a transducer and pen recorder.

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TABLE 1. Cause of Fecal Incontinence

| | |
|------------------------------------|----|
| Previous operation | 11 |
| Fistula operation | 7 |
| Hemorrhoidectomy | 2 |
| Presacral neurectomy | 1 |
| Subcutaneous sphincterotomy | 1 |
| Childbirth (third-degree tear) | 9 |
| Perineal trauma (traffic accident) | 4 |
| Perineal sepsis | 3 |

Measurements of resting and squeeze pressures were performed at 1-cm intervals, 1 to 5 cm from the anal verge. The maximum basal pressure was taken as the highest resting pressure at the five recording sites. Similarly, the maximum squeeze pressure was the highest pressure recorded after three repeated voluntary contractions at each recording site.

The severity of incontinence was graded preoperatively. Minor incontinence referred to episodes of fecal leakage occurring no more than once a month, usually associated with diarrhea. Moderate incontinence referred to patients who were incontinent at least once a week and could not control a solid stool. Severe incontinence referred to patients who had to wear a perineal pad because of incontinence on most days. Results of treatment were classified as no better if there had been no improvement, improved if there was still some lack of control, usually during an episode of diarrhea, and continent if there was complete control of feces and flatus.

Operative Procedure: The approach used for external sphincter repair depended on the site of sphincter damage. For tears through the posterior or posterolateral fibers of the sphincter, the patient was placed in the prone jackknife position with the buttocks strapped apart. The exposure used was described by York Mason for trans-sphincteric approach to the rectum.⁸ For patients with an anterior defect, the operation was performed in the lithotomy position. The operative procedure involved dissecting the mucosa from the scar tissue, using a circum anal incision. The sphincter was then dissected laterally from the defect until healthy muscle was encountered. Excessive lateral dissection was avoided so as to preserve the nerve supply entering laterally to the sphincter. After placing stay sutures through the scarred sphincter the center of the scar was divided, but none was excised. Both ends of the muscle were dissected free and a flap-over repair was performed, using interrupted Dexon® sutures. None of the sutures were tied until all had been placed satisfactorily. The mucosa was sutured back over the repaired sphincter to the skin defect, which was not closed completely to allow drainage. If a proximal defunctioning stoma was advised, a blind left iliac fossa loop sigmoid colostomy was raised.

TABLE 2. Grade of Incontinence Before Surgery

| | |
|--------------|----|
| Minor | 2 |
| Moderate | 2 |
| Severe | 18 |
| Not assessed | 4 |
| TOTAL | 27 |

Results

Causes of fecal incontinence are shown in Table 1. Eleven patients had had previous anal surgery, such as fistula operations, hemorrhoidectomy, presacral neurectomy, and subcutaneous sphincterotomy. Seven patients had had third-degree tears after childbirth. Four young men has sustained severe perineal trauma due to road traffic accidents associated with pelvic fractures and ureteral injuries. Three patients had had severe perineal sepsis, complicating Crohn's disease in one and from synergistic gangrene in two others. There were two patients with idiopathic fecal incontinence treated previously by postnatal repair who had had third-degree tears.

Six patients had been treated using an anal continence device, five had had postnatal repairs, and one had had a previous rectopexy. None of the patients had been rendered continent after these treatments.

Severity of incontinence is shown in Table 2. Eighteen patients had severe incontinence. Minor or moderate incontinence was observed in two and two patients, respectively. Assessment was not possible in four patients who had had colostomy for perineal trauma after road traffic accidents when they were referred.

Six of the patients had a colostomy raised at the time of sphincter repair and four had had a previous colostomy for perineal trauma. All colostomies were closed two to six months after sphincter repair.

Median follow-up was four years (range, 16 months to 9 years). Seven patients have been rendered completely continent of liquids and solid stool, 13 became continent of solids only, and 7 still have episodes of incontinence to solids after operation (Table 3). Seven complications developed in six patients: perineal sepsis (5), rectovaginal fistula (1), and anal stenosis (1).

Further treatment has been undertaken in the seven patients with poor results (Table 4). Two patients had a repeat sphincter repair 6 to 12 months later and achieved complete continence to liquids and solids. Three patients had postnatal repair; two of those patients achieved complete continence but the third did not. Three patients now have permanent colostomies. Two could not be rendered continent even after postnatal repair and graciloplasty. The other patient became completely incontinent after anal dilatation for anal stricture after sphincter repair.

Maximum resting anal pressure did not change signif-

TABLE 3. Initial Results of Sphincter Repair

| | |
|--|----|
| Continent of liquid and solid stool | 7 |
| Continent of solid stool only | 13 |
| Still have episodes of incontinence of soiling | 7 |

TABLE 4. Further Operations for Patients Having Poor Results After Sphincter Repair

| Patient | Further Operations |
|---------|---|
| 1 | Sphincter repair, good result |
| 2 | Sphincter repair, good result |
| 3 | Postanal repair, good result |
| 4 | Postanal repair, good result |
| 5 | Postanal repair, graciloplasty, colostomy |
| 6 | Graciloplasty, colostomy |
| 7 | Colostomy |

icantly after surgery. Maximum squeeze pressure tended to increase after surgery irrespective of the outcome, but this increase was not statistically significant. Preoperative maximum squeeze pressures in patients who achieved complete continence were significantly greater than those who did not (Table 5).

Discussion

The prime indication for sphincter repair is fecal incontinence resulting in disruption of the external anal sphincter due to trauma, iatrogenic injury, or obstetric damage.¹ Fecal incontinence secondary to central or peripheral neurologic disease or destruction of more than half of the sphincter is not suitable for sphincter repair because a functional motor unit is needed.⁹ Browning and Motson¹ reported a series of 97 patients, 60 percent of whom had been operated on because of sphincter damage after anal surgery. Iatrogenic injury due to fistula surgery was also the most common indication for sphincter repair in this series.

The results of direct repair of the divided sphincter by end-to-end suture are unpredictable, with failure rates in excess of 40 percent.¹⁰ Browning and Motson¹ recommended on overlapping sphincter repair to overcome the inherent tone in the external sphincter that tended to cause retraction of the muscle ends and disruption of the suture line. Fang *et al.*¹¹ also used an overlapping sphincter repair; they emphasized that the fibrous scar should not be sacrificed but preserved to provide support for the overlapping sutures.

The use of a diverting colostomy has been controversial. Some authors have recommended the procedure^{2,5} while others have not.^{6,7} Motson¹² reported that surgeons in North America rarely used a colostomy while those in Australia and the United Kingdom are more likely to do so. There were marked differences in cause—the majority of patients had obstetric injuries in North America and

TABLE 5. Anal Pressures Before and After Sphincter Repair: Median and Range (cmH₂O)

| | Total (N = 17) | Continence (N = 5) | Incontinence (N = 12) |
|--------------------------|-------------------|-----------------------|--------------------------|
| Maximum anal pressure | | | |
| Preoperative | 50 (7-107) | 58 (30-93) | 45 (7-107) |
| Postoperative | 43 (19-112) | 57 (20-112) | 36 (19-78) |
| Maximum squeeze pressure | | | |
| Preoperative | 93 (21-208) | 155 (74-208)* | 72 (21-161) |
| Postoperative | 100 (33-350) | 177 (70-350) | 93 (33-146) |

**P* < 0.05 vs. those with incontinence (Mann-Whitney U test).

Australia, whereas operative injuries were more common in the United Kingdom. Only ten patients in this series had diverting colostomies, but a stoma was already present in four because of severe trauma. The authors think that a colostomy should be performed for patients with large defects where the quality of bowel preparation is poor or those in whom previous surgery has failed. There is a higher risk of postoperative infection in all three groups and this complication is associated with poor functional results.

Factors associated with surgical failure usually include sepsis resulting in breakdown of the repair in the early postoperative period or fistula, and pelvic floor neuropathy.⁴ In this series functional results were poor in seven patients, two of whom had postoperative perineal infection; three had had a previous surgery for fecal incontinence. Five of the seven patients with poor results had obstetric injuries where there was some defect in the nerve supply to the pelvic floor as well as complete division of the external anal sphincter. Although one patient developed a rectovaginal fistula, continence has now been restored after satisfactory repair.

Unlike the authors' earlier reports and those from other institutions, anal pressures were not influenced by the operation although the maximum squeeze pressure tended to increase after the operation overall.^{1,5} Preoperative maximum squeeze pressure in patients who achieved complete continence was significantly greater than in those that did not, however. It is essential that the patient has an intact neuromuscular bundle with detectable voluntary sphincter contraction to achieve a satisfactory result from surgical repair.¹¹ These results support this and the results of sphincter repair seem to be predictable by preoperative measurement of external anal sphincter function.

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