An Anatomical Analysis of the Treatment of Prolapse of the Rectum*

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SUMMARY

The changes which may accompany prolapse of the rectum are outlined. The aims of surgeons operating on patients with prolapse are briefly expounded.

The operative procedures employed to achieve these aims are then reviewed and critically examined.

Anatomically the success of the Ivalon sponge technique depends on minimal disturbance of Waldeyer’s fascia and restoration of anchoring mechanisms and angulation.


When the ingenious mechanisms which combine to maintain the pelvic organs in situ are unequal to the countervailing forces of intra-abdominal pressure and gravity, descent of viscera below the pelvic floor occurs.

This is often accompanied by (a) loss of angles between the pelvic organs and their ‘tubes’ which traverse the floor; (b) loss of the anchoring and supporting provided by striated muscle and connective tissue, including fat; (c) altered reservoir function; (d) interference with the neural feed-back circuitry of the region; and (e) failure of the sealing devices provided by smooth muscle, venous channels and elastic tissue which may predispose to mucosal prolapse. These anatomical arrangements and some of their applications are described in a separate communication.2

The literature on prolapse is overwhelming—a testimony to the problems it presents. A recent review by Mann3 puts many of its facets into perspective.

GENERAL REMARKS

In children, straining is a major cause4 and in young and old, diarrhoea is frequently a precipitating factor. Prolapse occurs very often in institutions for the elderly and in psychiatric hospitals, where inmates frequently become chronically constipated; in these situations active pelvic exercises and perhaps electrical treatment might be of use in their prevention.

Patients with prolapse are particularly liable to become incontinent and cure of the prolapse does not correct this disability in a disappointingly high proportion of patients.5

It is difficult to group procedures logically, because most surgeons seem to have several aims in mind when they operate for prolapse. I shall list these aims and then consider briefly how various operations fulfil expectations.

(a) Alteration of pelvic peritoneal floor. Since Moschowitz6 first advanced his ‘sliding hernia of the pouch of Douglas’ theory, obliteration of the deep pouch has been frequently practised.

(b) Strengthening of a weak or inadequate pelvic diaphragm.

(c) Compression of anorectum or anal canal, or both.

(d) Removal or plication of the prolapsus or of apparently redundant mobile loops of bowel.

(e) Suspension or fixation of the bowel, with restoration of its anatomical relationships.

In particular cases, each of the above may have effected cure, but a critical survey of the available literature shows that category (e) confers greater advantages than the others.

I shall briefly review the literature in a highly selective way and attempt to prove why the operation, which has proved most successful, deserves its acclaim.

Moschowitz’s7 article is interesting, not so much for the theory which he advanced, as for his statements on hernia in general which strike a very modern note. Since his time all surgeons have removed redundant peritoneum in relation to the recto-uterine or rectovesical pouches.

At a Royal Society of Medicine meeting in 1933, Miles8 spoke of an ‘internal organ persisting in its endeavour to become an external organ’ and noted that eversion and extrusion of the wall of the rectum involved its whole circumference. He reported success with rectosigmoidectomy, followed by pelvic exercises. He treated his first case in 1904 and had 31 to date, 7 men and 24 women; only 1 had recurred.

Commenting, Gordon-Watson9 noted pelvic floor laxity of severe degree in a percentage of patients which precluded the permanent success of any operation. He referred to electrical stimulation of the pelvic floor as carried out by Heald.

Graham10 noted that the ‘posterior wall of the rectum is carried forward from the sacrum making the rectum now almost a straight tube with the fascial supports most inefficient due to over-stretching’. He claims that ideas on this mechanism date back further than Moschowitz to Jeannell in 1890. Although he believed that the anatomical defect was in the pelvic fascia he did not appreciate the parts most vitally concerned and his operation does not adequately restore the anchoring mechanisms or ensure that the bowel is replaced in its pristine position. Such success as he had was probably due largely to induced fibrosis.

Pemberton11 advocated thorough mobilization of the bowel to the tip of the coccyx and then fixation, so that a mass of scar tissue would hold it in its sacral bed. Pemberton et al.12 viewed the records of all prolapse

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cases from 1910 to 1951 and the results of his own suspension fixation operation, and recorded an 11.4% recurrence rate with this operation.

Muir\textsuperscript{11}, in his Presidential address to the Royal Society of Medicine, spiritedly invoked the past with its down-to-earth phraseology. Paré, who wrote on the 'falling down of the Fundament', also quoted the Hippocratic treatment of hanging the 'patient by his heels' and shaking him until 'the guts by that shaking will return to its place'. Muir prescribed anterior resection as the treatment of choice. Muir noted that Wiseman (1676) envisaged the Tiersch procedure, when he fastened a tin hoop to a quilted bolster fitted with a bandage, to be applied during defaecation and so prevent prolapse. Muir's X-ray faecograms were self-explanatory and he quoted Berglas and Rubin on levator myograms. He also showed his own pictures which illustrated some widening of the levator hiatus. This technique, as he admitted, was hardly contributory as decades of work had proved laxity at the anorectal junction.

Swinton and Mathieson\textsuperscript{12} felt that, among other procedures, a modified Delorme procedure was the best treatment for severe degree of prolapse in the elderly and frail. However, removal of rectal mucosa in such cases would tend to counteract the good effect of a contrived muscle ring reinforcing the anorectal one.

Goligher\textsuperscript{13} in 1958 introduced his well-known modifications of Graham's operation, which has enjoyed a considerable measure of success, due to the scar tissue it engenders. Suture of cranial and caudal (puborectalis) fibres behind the anorectal junction, described as an alternative technique, has the additional advantages of restoring the anorectal angle and bolstering the ano-cccygeal raphe. He reported recurrences in 23 patients followed up for 7 years. As recurrence is usual within 12 months this is a very fine record.

Shann\textsuperscript{14} gave an historical review of operations for prolapse and referred to Bacon's excellent review, which I have been unable to obtain. He concluded that a knowledge of normal anatomy was what is required if the condition is to be adequately remedied. His own description of anorectal anatomy shows room for improvement, as the following instances demonstrate. He does not mention the relations of the pelvic fascia to the anorectal junction, nor the attachment of levator fibres to the bowel wall. He comments on how at the perineal flexure the 'anterior wall becomes the posterior wall and fits snugly under the pelvic floor'. The anal canal, he says, because it is not a pelvic organ, is placed under the pelvic floor. 'This is very important. It has no muscular support except for a thin perineal fascia, is practically a subcutaneous structure and is therefore vulnerable in the sense that it is easily displaced from its normal location!'

Few must have realized the significance of Wells\textsuperscript{15} announcement that, to the already considerable number of operative procedures available for prolapse, he had added one more. Research by Wood, among others, had shown that polyvinyl alcohol sponge (Ivalon) induced fibrosis and itself finally disintegrated and became incorporated in the tissues. Wells described his technique of fully mobilizing the rectum and anchoring the terminal bowel to the sacrum by means of an Ivalon sponge wrapped three-quarters of the way round the bowel.

In 1962, at a Royal Society of Medicine meeting, Wells presented his successful results and recorded no mortality. Morgan noted the improvement in results achieved by Wells' method and described his own success with it. At the same meeting Hughes and Glasadell\textsuperscript{16} reviewed an operation which they describe as essentially similar to the Graham-Goligher-Snellman procedure, differing only in the way in which the levator is sutured. (Snellman added suturing of the rectum to the sacrum, to Goligher's operation. I have not been able to obtain Snellman's account.) However, they added perineorrhaphy and did not mention anchoring the bowel to the sacrum. They claimed good results for their procedure which seems fully to mobilize the rectum.

In their illustrations the sutures in the levators look as if they could easily damage the urethra or the prostatic plexus of veins.

Todd\textsuperscript{17} at the same meeting predicted the 'descending perineal syndrome' and remarked poor rectal sensation pre- and postoperatively in these cases. His comments, as usual, were pertinent and wise. The rectum should be mobilized and put back where it belongs. Rectal sensation must be preserved and plication of overstretched muscles would do no good. Muir\textsuperscript{18} at the same meeting firmly defended his anterior resection. He reported no recurrence in 8 patients over 6 years.

Backer and Baden\textsuperscript{19} did a modified Pemberton, which fastened the rectum to the anterior longitudinal ligament on the promontory of the sacrum.

Beahrs\textsuperscript{20} et al.\textsuperscript{20} carried on Pemberton's study from 1951 to 1962. Of those reviewed, who were mainly female and ranged in age from 18 months to 81 years, 86 were treated by one of three procedures: Pemberton's operation 52; anterior resection and Pemberton's fixation 19; Altemeier's one-stage repair 15. The recurrence rate with Pemberton's method had risen to 34.6% from the original 11.4%. No recurrence followed anterior resection and fixation, and, with Altemeier's one-stage procedure a 20% recurrence rate was recorded.

Thomas and Jenkins\textsuperscript{21} again noted physiological mechanisms with poor internal sphincter response in patients with prolapse. They also stated that inhibition of the external sphincter was produced more readily, more completely, and for a protracted time—all facts established by Porter.\textsuperscript{22} They recommended a posterior approach of the Kraske type through which, if necessary, redundant bowel could be removed.

Devadhar\textsuperscript{23} described a 'crucial point' at which intussusception occurred due to powerful muscular forces. By longitudinal plication of the rectal ampullary wall he claimed that 28 patients had been treated. Mucosal laxity, due to sphincter deficiency, was treated by a Thiersch silver wire in occasional cases. He believed the prolapse to be the cause of a wide levator hiatus and not the result of it. He did not invoke anchoring factors.

Ripstein\textsuperscript{24} claimed that he had restored the anorectal angle by wrapping Teflon round the rectum and fixing it to the hollow of the sacrum. The rectum thus was
unable to pass straight downwards and prolapse—an echo from Graham. His results with this procedure were very good.

Parks\textsuperscript{32} proposed the building up of a muscle bar behind the anal canal to restore the anorectal angle and improve continence. His operation is designed to raise the pelvic floor in this region, and consists of finding a plane behind and lateral to the anal canal between it and the ‘external sphincter, puborectalis and levator ani’ and then entering the ‘true pelvis by division of Waldeyer’s layer’. Then a repair in layers is performed and the external sphincter is tightened. Such a procedure must sever the bowel from the levator contribution to the conjoined coat behind. It also injures all the layers of the stratified anococcygeal raphe and laterally divides the pelvic nerves. In addition, abundant sutures are placed in muscle, which already has reduced tone and efficiency, and it is now required to overcome the above-mentioned handicaps. He noted that this repair is easily disrupted by defaecation and straining. Such an operation is anatomically unsound and his good results are unexpected.

Naunton Morgan and Porter\textsuperscript{33} reported results with Ivalon sponge implants, noting that in 100 cases only 1 recurred, and continence was improved in 50%. There was still a place for a Thiersch type of procedure in poor-risk patients, they believed. Their excellent results have been corroborated by Brown\textsuperscript{34} of Cape Town, among others.

The plane of insertion of the Ivalon is behind Waldeyer’s fascia but above the muscle of Treitz and the levator ani muscles. On each side of the bowel the sponge is threaded through Waldeyer’s layer and lightly anchored to the bowel wall, leaving a gap in front, and posteriorly it is attached to the front of the sacrum. In the course of this part of the procedure the median sacral veins are prone to be caught in sutures and ooze. Careful extraperitonealization of the Ivalon is then achieved and abundant sutures are placed in muscle, which already has reduced tone and efficiency, and it is now required to overcome the above-mentioned handicaps. He noted that this repair is easily disrupted by defaecation and straining. Such an operation is anatomically unsound and his good results are unexpected.

CONCLUSIONS

The advantages of the Ivalon sponge implant depend on the anatomical soundness of the procedure, viz.: Waldeyer’s layer, with its contents and ligaments, is minimally disturbed; the fibrosis induced by the sponge reinforces the fascial anchoring provided by the superior fascia of the levator, Waldeyer’s layer and the ligament of Treitz, and so compensates for fascial and muscular deficiencies at the anorectal junction; and replacement of the rectum in its sacral bed restores the anorectal angle. As a result, there is a fair chance that normal physiological function will return. Time and pelvic exercises may improve the outcome still further.

REFERENCES