Age and Sex

In an analysis of the complications with regard to age and sex, the only finding of significance was with MAD where most of the complications were found in the older group of patients (Table 3).

Table 3

Complications of maximal anal dilatation above and below 65 years

	Under 65	*Over 65*
Recurrence	2	3
Prolapse	0	6
Fæcal incontinence	1	1
Good result	83	4

Discussion

Although the complications were different in type, for each of the three methods of treatment reviewed, the number of patients who had complications were similar in each group and this applied to the re-operation rate too. Chant *et al.* (1972), reporting on a small series of patients randomly allocated to MAD and hæmorrhoidectomy, showed better results for the latter in terms of controlling prolapse but essentially similar results for each method regarding other symptoms. In the present series, the final satisfaction rate was higher in the hæmorrhoidectomy patients but this did not reach statistical significance.

It has been said that discomfort is common following EBL (Groves *et al.* 1971) but we have found that its occurrence can be minimized by maintaining the ligation well above the pectinate line. Severe pain was relatively uncommon but its occurrence was the most frequent cause of failure of this procedure, as the patient would not permit further treatment by EBL.

Pain and perianal bruising after MAD was also noted as a feature but again it was uncommon for this to be severe. On rare occasions, what appeared to be thrombosed piles have prolapsed and we feel that this may give a clue as to the mode of action of this procedure. There may be a traumatic thrombosis in the vascular element of the pile and this is kept in a collapsed position by the sponge pack so that the thrombotic episode does not become clinically apparent. It may be significant that all our patients with severe postoperative pain eventually had an excellent result. Against this hypothesis is the finding by Fussell (1973) that failure to use the dilator postoperatively was associated with poor results.

It is clear from our results that the period of hospitalization and convalescence attendant upon hæmorrhoidectomy is difficult to justify. A more minor surgical procedure should be the primary treatment for this condition, but it is less certain which minor procedure should be chosen.

Our findings suggest that MAD should not be used in the older patient. Graham-Stewart (1963) divided hæmorrhoids into 'mucosal' and 'vascular', with the former more common in the older patient, the mucosa thickened and fibrosed and the vascular element playing a less important part. The poor results of MAD in this group of patients may reflect on its use for mucosal hæmorrhoids so that elastic band ligation is more suitable in the older patient.

Our present policy, based on the findings of this study, is in general to carry out Lord's procedure (MAD) on patients under the age of 55 years and Barron's ligation (EBL) in the older patient, reserving hæmorrhoidectomy for the failures.

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Electromyographic Changes in Certain Pelvic Floor Abnormalities

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This is a preliminary report on a pattern of electromyographic change which has been observed during routine pelvic floor electromyography. Beck (1930) was the first to investigate the anal sphincter using this technique, but it was Floyd & Walls (1953) who first demonstrated the continuous tonic activity in the pelvic floor muscles which persist even during sleep. Taverner & Smiddy (1959) made similar observations. The reflex activity of these muscles has been investigated (Parks, Porter & Melzak 1962) and Porter (1962) described the pathological changes found in rectal prolapse in considerable detail.

One of the essential features of anorectal anatomy in the maintenance of continence is the 90° angle made between the axis of the lower rectum and the anal canal. The effect of this is to form a physiological flap-valve (Fig 1), in which the anterior rectal mucosa comes to lie over the upper end of the anal canal, thus occluding it. Any increase in intra-abdominal pressure will tend to drive this valve of mucosa even more firmly over the upper end of the anal canal, so

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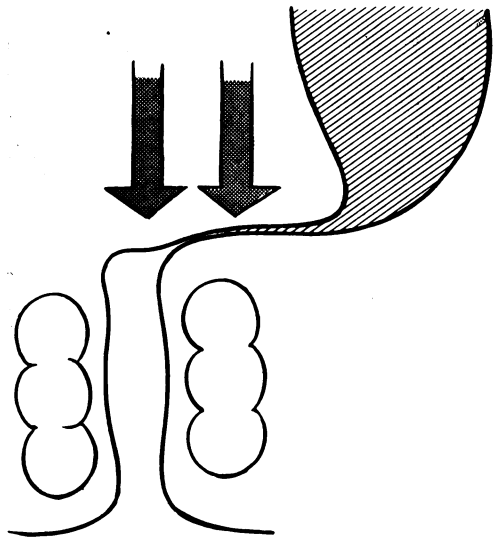

Fig 1 *Flap-valve mechanism at the anorectal junction*

preserving continence. This mechanism is effective as long as the anorectal angulation is maintained and so long as the resting anal sphincter tone is sufficient to keep the anal walls in apposition. Anorectal angulation is maintained by the tonic activity of the puborectalis muscle, and any change in its activity will affect the normal functioning of the anorectal mechanism. For defæcation to occur, the anorectal angulation must become less acute through lengthening of the puborectalis muscle, and descent of the anorectal region. This can happen either by reflex inhibition and relaxation of the puborectalis muscle, or through passive stretching of the muscle as the result of straining efforts.

The particular phenomenon investigated in the present study is the response of the pelvic floor muscles to straining efforts such as are made to initiate defæcation. The first papers reporting the reflex response to straining described complete inhibition of the puborectalis and external sphincter muscles (Taverner & Smiddy 1959, Parks, Porter & Melzak 1962, Porter 1962) (Fig 2). Kerremans (1969) has cast doubt on this clear-cut pattern and has described a more variable response to straining efforts; in his cases some patients showed inhibition, some were unchanged, and yet others were noted to have overactivity in the muscles of the pelvic floor.

Technique

A fine concentric needle electrode is inserted without local anæsthesia into the puborectalis muscle in the midline posteriorly; another similar needle is passed into the superficial external anal sphincter laterally. Simultaneous recordings of rectal pressure are made using a rectal balloon, and anal pressure by means of a very fine open-ended, water-perfused tube. The patient is then asked to carry out a number of manœuvres, including contraction of the pelvic floor musculature and bearing down as in an attempt at defæcation. The muscle potentials and intraluminal pressures are all recorded simultaneously on ultraviolet sensitive paper.

Results

We have failed to find the clear-cut pattern of inhibition described by the earlier workers and our results are more in accord with those of Kerrmans. In particular, we wish to report an unusual electromyographic pattern that has been seen on several occasions in two groups of patients. In these cases defæcation straining induces a grossly abnormal overactivity in the puborectalis, usually accompanied by little change or inhibition in the superficial external sphincter (Fig 3). This phenomenon can be consistently and repeatedly observed in the same patient, which excludes a psychological failure to inhibit the muscles, due to embarrassment or fear of incontinence. The overactivity in the puborectalis which consists of increase in both frequency and amplitude of electrical activity, persists as long as the bearing down effort is sustained and occurs whether the effort is gentle or powerful. It was observed in particular in two conditions: the solitary ulcer syndrome and the descending perineum syndrome.

(1) *The solitary ulcer syndrome:* The condition of solitary ulcer of the rectum was first described by Cruveilhier (1842). A comprehensive account of the condition was given by Madigan & Morson (1969) as a result of their experience at St Mark's Hospital where the condition has been known as the solitary ulcer syndrome for some years. As its name implies, the ulceration is usually solitary and is frequently found on the anterior wall of the rectum. The etiology of the condition remains unproven, though a number of different possi-

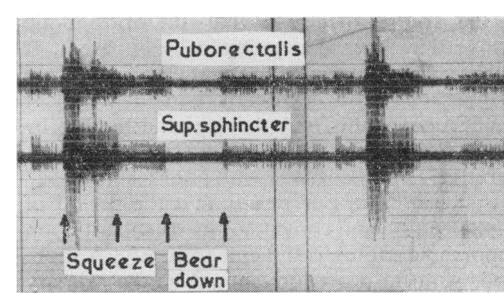

Fig 2 *Showing inhibition on bearing down*

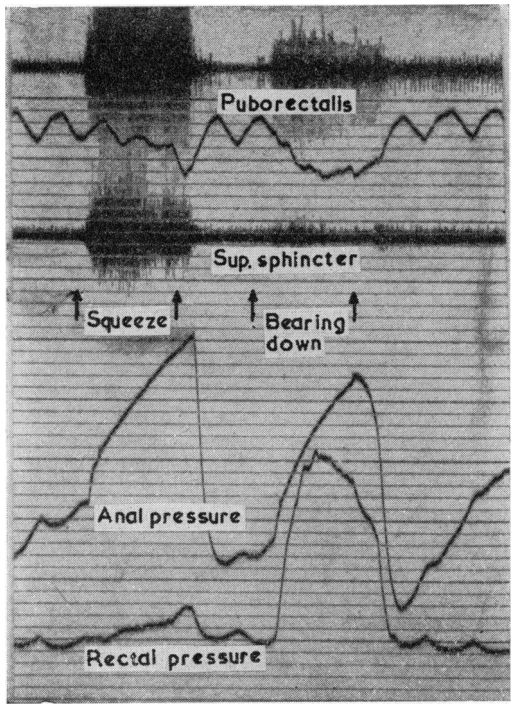

Fig 3 *Overactivity on bearing down*

bilities have been suggested, ranging from inflammatory bowel disease to a hamartomatous abnormality of the rectal mucosa (Allen 1966, Wayte & Hillwig 1967). Trauma has also been suggested as a factor. It is a relatively rare condition and only 8 patients have been studied electromyographically. Of these, 7 showed the grossly excessive overactivity described above, and all but one of them admitted to excessive straining efforts during defæcation.

(2) *Descending perineum syndrome:* This is a condition in which patients may suffer from a number of symptoms such as perineal discomfort, sensation of a lump in the anal canal, obstructive defæcation, and the passage of blood and mucus (Parks *et al.* 1966). The symptoms are due to a weakened pelvic floor musculature, and are in a large measure caused by prolapse of the anterior rectal mucosa as a result of excessive straining. The electromyographic changes in this condition were described as being excessively easy, and prolonged inhibition on defæcation straining (Parks *et al.* 1966). This has been confirmed in the present work but it is suggested that it is the final stage in cases of long established dysfunction. In earlier stages of the condition the abnormality described above seems to occur; that is, gross overactivity of the puborectalis with complete absence of any inhibition. Twenty-one patients with this syndrome have been investigated; 8 showed easy inhibition, 8 showed excessive overactivity, and 5 were equivocal.

Discussion

Patients with either condition, for reasons as yet not understood, develop a failure in the normal function of their pelvic floor musculature as a result of which they must defæcate through an unrelaxed puborectalis sling. The effect of this is to traumatize the anterior rectal wall mucosa, by forcing it under considerable pressure into the closed upper end of the anal canal. It is the anterior rectal mucosa that is the commonest site of solitary rectal ulceration. It is the anterior rectal mucosa that prolapses into the anal canal in the descending perineum syndrome, and the anterior rectal mucosa that forms the flap of the physiological flap valve. The histological appearance of the solitary ulcer syndrome is characteristic, yet occasionally biopsy of the anterior mucosal prolapse in the descending perineum syndrome will show identical histological appearances.

The history of one patient in particular gives considerable support to the theory that trauma plays the major part in the pathogenesis of solitary rectal ulceration. She was a woman of 28 years who presented originally with complete rectal prolapse in association with a grossly lax perineal musculature. She was treated by postanal

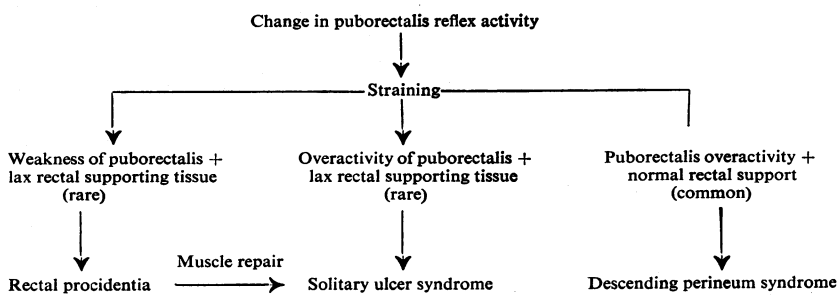

Fig 4 Suggested sequence of events

perineorrhaphy in which the lax puborectalis was repaired and the anorectal angulation restored. This relieved both her rectal prolapse and her incontinence, but within a few months of the operation she was found to have a large solitary anterior wall rectal ulcer, which on biopsy showed all the characteristic features of solitary ulceration. Before operation, when her anorectal musculature was totally inadequate, she had rectal prolapse but no solitary ulcer. As soon as the anatomical defect was repaired, straining efforts which previously caused prolapse then traumatized the anterior rectal wall mucosa, resulting in a solitary ulcer.

It is impossible at this time to be sure of the sequence of events which leads up to the development of the solitary ulcer syndrome and the descending perineum syndrome; nor can their relationship be determined with certainty. The one is so rare, the other so common. It is tentatively suggested, however, that the following hypothesis will be helpful for the pursuit of further investigation (Fig 4).

In the normal state, a rise in intra-abdominal pressure causes reflex contraction of the puborectalis. Defæcation straining, on the other hand, generally results in a certain degree of puborectalis relaxation, allowing the passage of a stool. It is suggested that in a certain group of patients this relaxation fails to occur, and excessive straining efforts are made against an unyielding floor. In a small proportion of these, an associated abnormality such as lax rectal supporting tissue allows descent of the rectum within the pelvis, as a result of which the anterior rectal wall may be driven into the upper anal canal with the puborectalis still resisting the increased abdominal pressure. The rectal wall suffers repeated trauma and a solitary ulcer develops.

The majority, however, who have normal rectal supporting tissue, and in whom rectal wall trauma does not develop to the same extent, develop symptoms of the perineal descent syndrome; they get prolapse of the mucosa of the anorectal region but not of the rectal wall higher up, where most solitary ulcers are found. Over the years the puborectalis becomes weakened by repeated straining, perineal descent becomes more marked and mucosal prolapse occurs, usually beginning anteriorly and eventually becoming circumferential.

There would appear, therefore, to be two important factors in the development of these conditions. Firstly, straining is essential, and this is associated with an abnormality in sphincter physiology. Secondly, the effectiveness or otherwise of rectal supporting tissue is important. If the latter is good, only the descending perineum syndrome will occur. If it is lax, and the puborectalis maintains its tone, the solitary ulcer syndrome will occur. If the puborectalis and the superficial sphincter are weakened as well, then complete rectal prolapse may occur.

It would thus seem that both the solitary ulcer syndrome and the descending perineum syndrome may be different manifestations of the same underlying pelvic floor defect, namely overactivity in the pelvic floor musculature. This is a preliminary report and further investigations are in progress.

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Vaginoplasty in Excision of the Rectum [*Summary*]

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After excision of the rectum in females, persistent perineal sinus is often a serious disability, especially where surgery has been carried out for inflammatory disease of the bowel. This problem may be eliminated by a routine excision of the rectum which initially leaves the posterior vaginal wall intact. The posterior vaginal wall is then divided in the midline from the introitus to the cervix. Then transverse cuts are made at the level of the cervix to free the vaginal wall flaps. These rotational flaps are then sutured to the side walls of the cavity left by excision of the rectum, and the perineum built up to form the basis of the new posterior vaginal wall. The skin wound is closed in its entirety, drainage occurring through the newly constructed vagina. Once-daily irrigation and dressing is all that is necessary postoperatively and the patient should be ready for discharge from hospital in two to three weeks. New epithelium rapidly covers the posterior wall, making it extremely difficult to discern any vaginal abnormality.

Twenty-six patients, 18 with rectal carcinoma, 5 with Crohn's disease and 3 with ulcerative