

Procidentia of the Rectum Studied with Cineradiography:

A Contribution to the Discussion of Causative Mechanism*

B. BRODÉN, M.D., B. SNELLMAN, M.D.

From the Roentgenological and Surgical Departments of S:t Görans Hospital, Stockholm, Sweden

THE MECHANISM causing procidentia and its anatomy has long been under discussion. Goligher⁵ summed up current views in 1958, assigning the causes to the following three main groups (see also Khubchandani and Bacon⁷):

1. The presence of an abnormally deep rectogenital pouch. With this abnormality, the small intestine, which lies against the anterior wall of the rectum, forces the rectum out through the anal canal.^{3, 5, 6, 8, 12}
2. The lax and atonic condition of the muscles of the pelvic floor and anal canal.¹⁴
3. Lack of normal fixation of the rectum.^{9, 10, 15}

Using a special roentgenologic technic,⁴ Snellman,¹³ in 1961, demonstrated two forms of procidentia. In one, small intestine was present in the procidentia, suggesting that cause 1 above, is correct. However, in the second form, the procidentia contained no small intestine, implying that in these cases the small intestine was not forced out with the rectum (Figs. 1 and 2). In many instances sphincter function returned to normal after Graham's operation, suggesting that in these cases the prolapse was not attributable to an atonic condition of the sphincter.

Ripstein and Lanter¹¹ have observed that in all of their cases of procidentia the rectum was displaced anteriorly from the hollow of the sacrum. According to these

authors, the straight course of the rectum through the pelvis could allow a sliding hernia through an anterior defect in the pelvic floor.

In this presentation we intend to show that these supposed etiologic conditions are not the cause but are more likely to be the result of rectal intussusception beginning just above the peritoneal reflection and prolapse.

We have studied procidentia and conditions presumed to be precursors by means of cineradiography of the rectum with the patient straining at stool, with contrast medium in the rectum, small intestine and vagina. Preliminary results were published in 1961.¹

Terminology

The conditions described in this presentation are termed internal intussusceptum and procidentia, and the events preceding and leading to them are called internal intussusception and prolapse, respectively. Internal intussusceptum is synonymous with "concealed procidentia."² Enterocoele is a peritoneal pouch containing small intestine.

Material

Patients were observed in the Department of Surgery of St. Görans Sjukhus for anal disorders. When certain symptoms were noted, they were referred to the Department of Roentgenology for cineradiography of the rectum while the patient was straining at stool. Many were admitted after the roentgenologic examination and operated upon in the Department of Surgery. The

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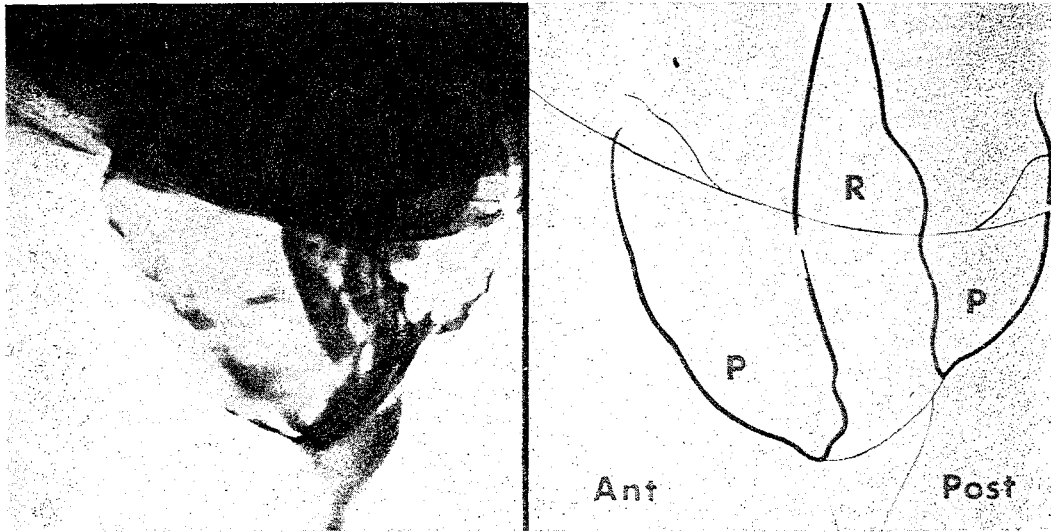


FIG. 1. Procidentia without enterocele. Roentgenogram and drawing (conventional roentgen films). P = procidentia; R = rectum.

series presented in this paper consisted of 48 women and six men.

Symptoms

Patients without Procidentia: The series included 21 patients who had not had proci-

dentia. They had symptoms suggestive of anal insufficiency (burning, itching, or unintentional passage of gas or loose or formed stools), or they felt "a lump" inside the anus, or had a constant desire to defecate. Symptoms of a similar nature have been

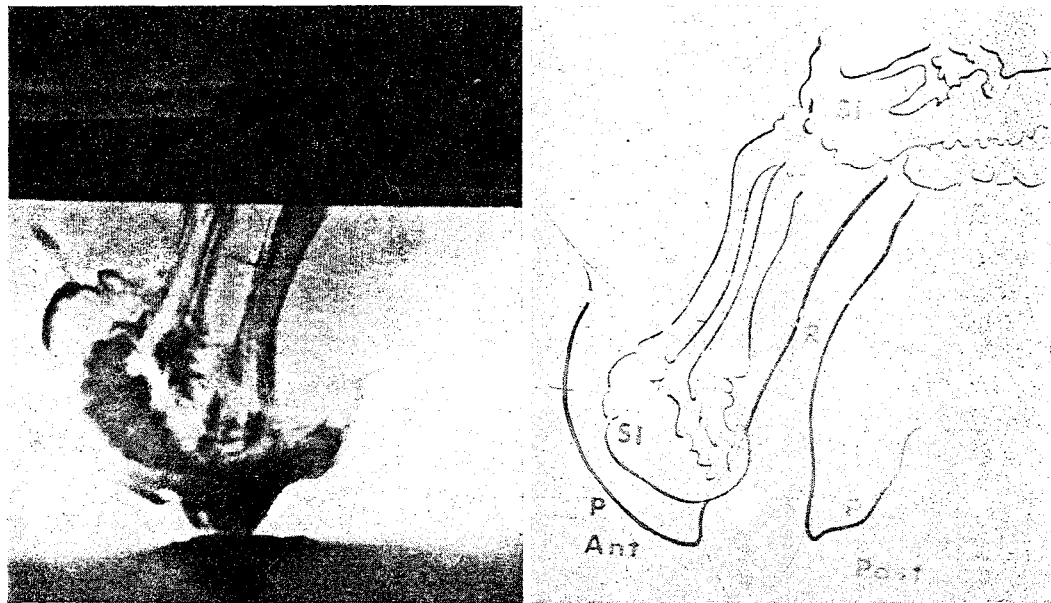
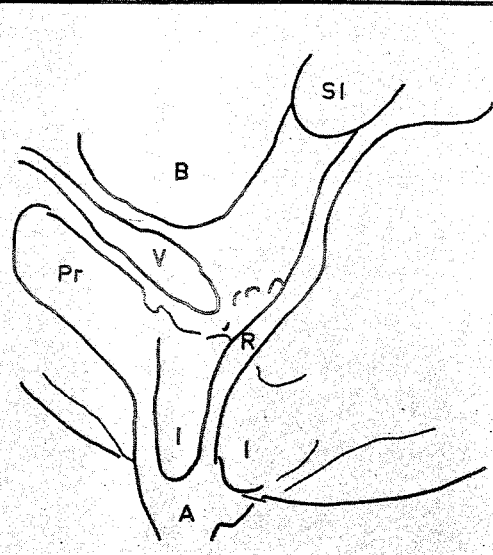
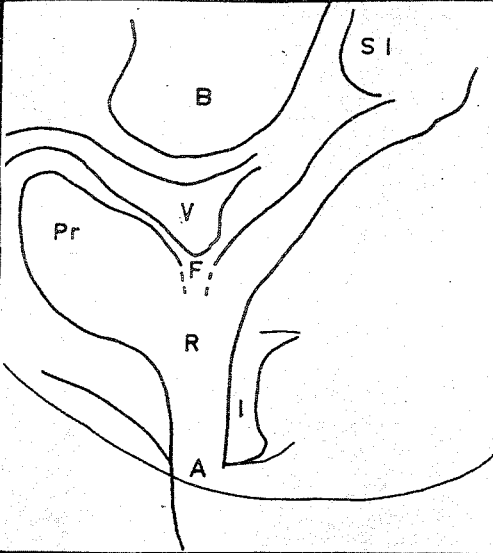
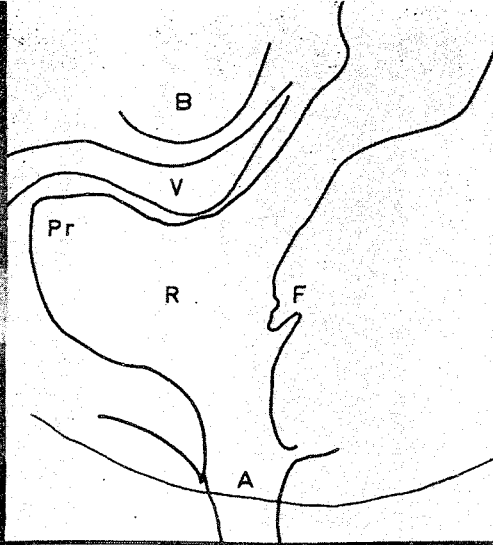


FIG. 2. Procidentia with enterocele. Roentgenogram and drawing (conventional roentgen films). P = procidentia; R = rectum; SI = small intestine.



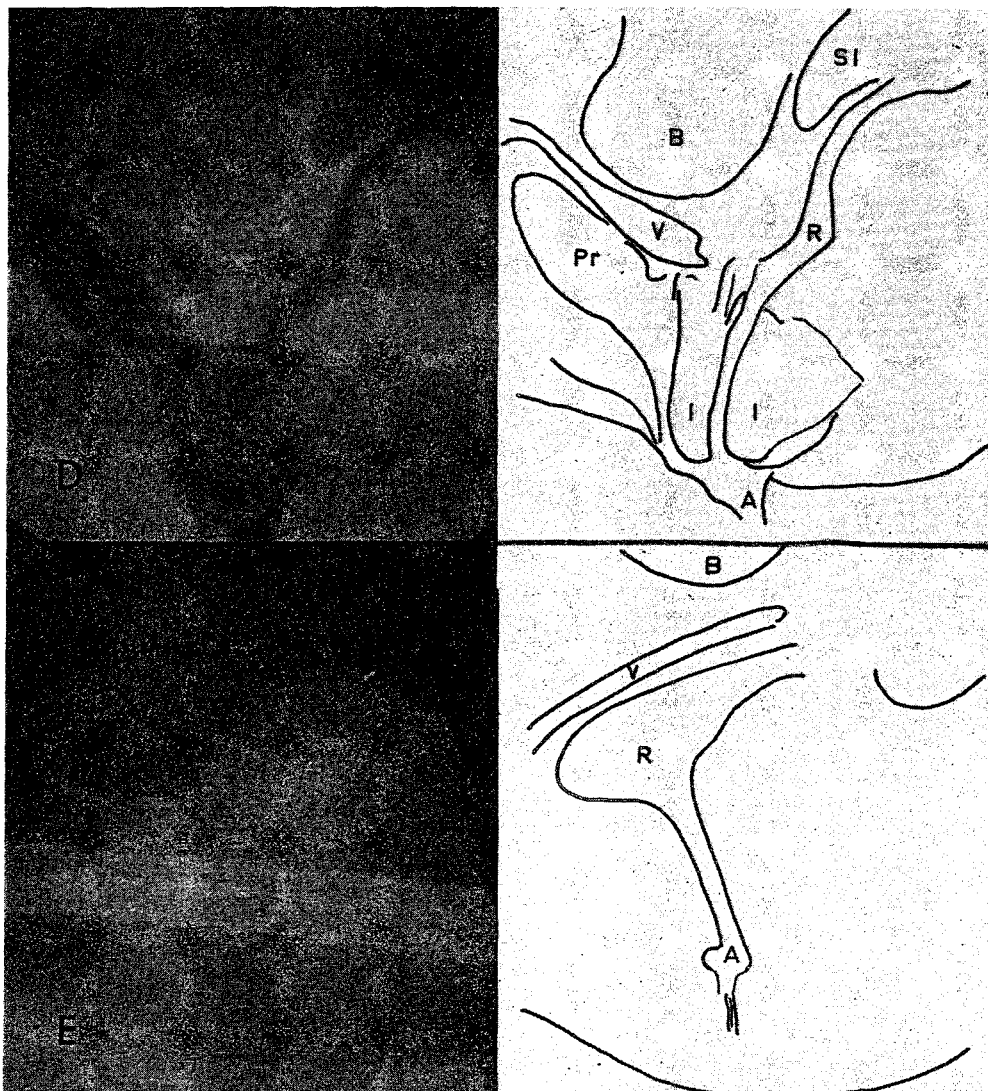


FIG. 3. Internal intussusception without enterocele in a 56-year-old woman. *a* through *d*. Defecation and straining at stool. *a* and *c*. Fold in rectal wall (6 to 8 cm from anus) deepens and proctocele develops. Depression of vagina together with anterior rectal wall. *c* and *d*. Distinct intussusceptum extending through anal canal to anus, but no prolapse. Rectal lumen centrally. Small intestinal loops high up. *e*. Straining down stopped. Apart from minor proctocele there is no persisting deformity of rectum. A = anus; R = rectum; Pr = proctocele; V = vagina; B = urinary bladder; SI = small intestine; F = fold; I = intussusceptum.

described by Castro² and Tuttle.¹⁵ In many instances, clinical examination revealed a reduced tone in the anal sphincter, and in every case digital examination by way of the anus, with the patient straining down, showed a soft mass descending into the distal portion of the rectum and often into the anal canal but not through the anus.

In some instances, the anus became dilated when the patient strained down, and the mass, covered by rectal mucosa, was seen through the opening. The mucosa was sometimes reddened, edematous and, occasionally, ulcerated. Proctosigmoidoscopy with the patient in the kneeling position in these cases often revealed nothing abnor-

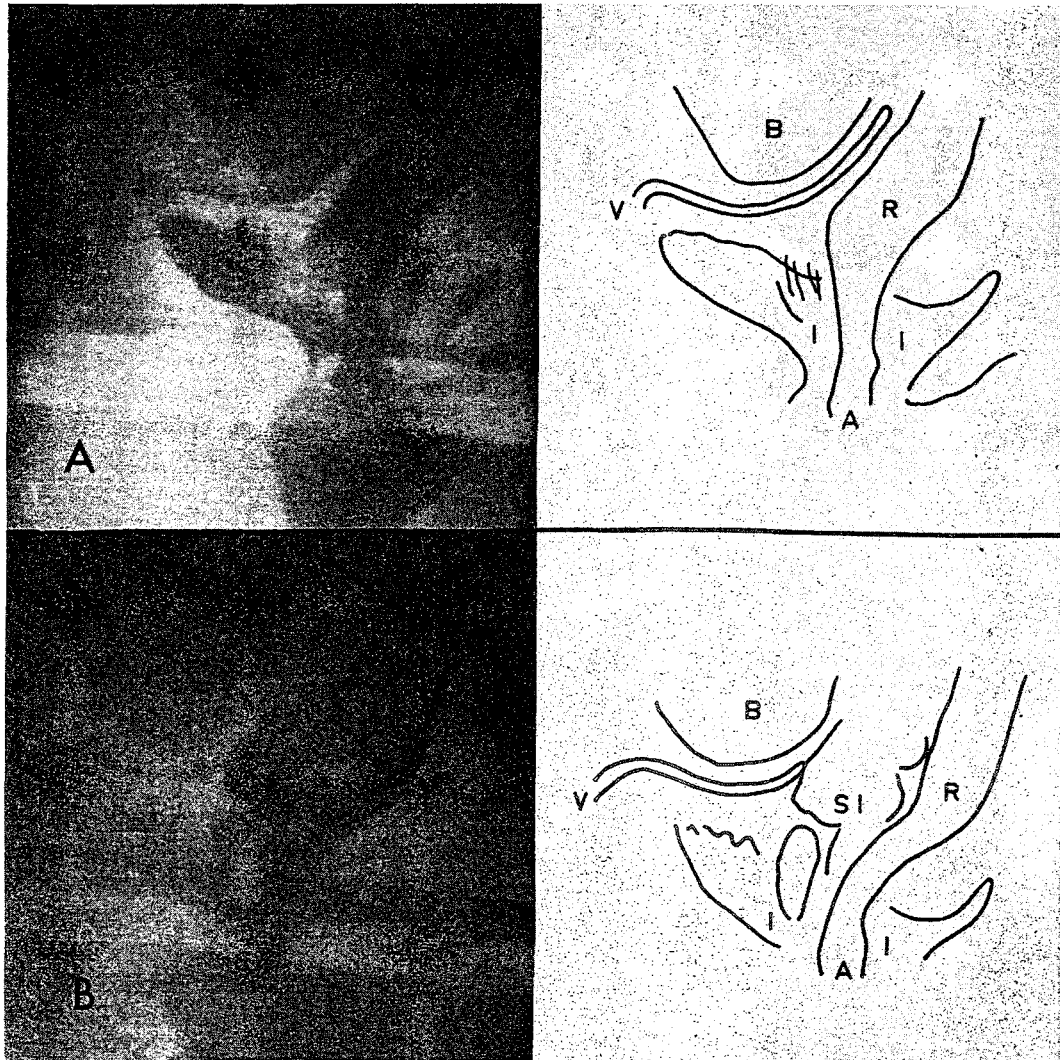


FIG. 4. Internal intussusception with enterocele in a 54-year-old woman. *a.* Defecation and straining at stool. Rectal intussusception but no prolapse. Small intestine is high up and does not appear. *b.* Continued straining. Small intestine has sunk and is perceptible in upper portion of intussusceptum. A = anus; R = rectum; V = vagina; B = urinary bladder; SI = small intestine; I = intussusceptum.

mal, although in some instances reddening and even ulceration were observed, usually 6 to 8 cm up on the anterior rectal wall.

Patients with Procidentia: Thirty-three patients had procidentia. Many had suffered from the same symptoms as those without procidentia for periods of one to five years before they noticed procidentia.

Roentgenologic Technic

First, patients were given a barium meal.

When this reached the small intestine in the rectogenital pouch, contrast medium was introduced into the rectum and vagina. In the rectum, a thick barium-contrast medium, the consistency of feces, was used, and in the vagina viscous contrast medium was used. The urinary bladder also was filled with contrast medium in some female patients.

The examination was performed on a conventional tilting examination table in

the upright position. The patient sat on a lavatory seat placed on the footrest of the table. The entire seat was made of plexiglass, which permitted inspection of the perineum. Filming was done in lateral projection (frontal projection of the rectum being very difficult to achieve with the patient in the sitting position).

Defecation was filmed with a 35-mm camera through a 9-inch image intensifier at a frequency of six to eight pictures per

second. This speed was fast enough to permit all important events to be recorded. Through a viewing mirror, the examiner could observe the course of defecation while the film was being run, and the screen could be focused as necessary.

The use of an image intensifier kept the roentgen dose so low that, although a film was being taken, the gonadal dose did not exceed that of conventional examinations in this region (less than 1.2 r).

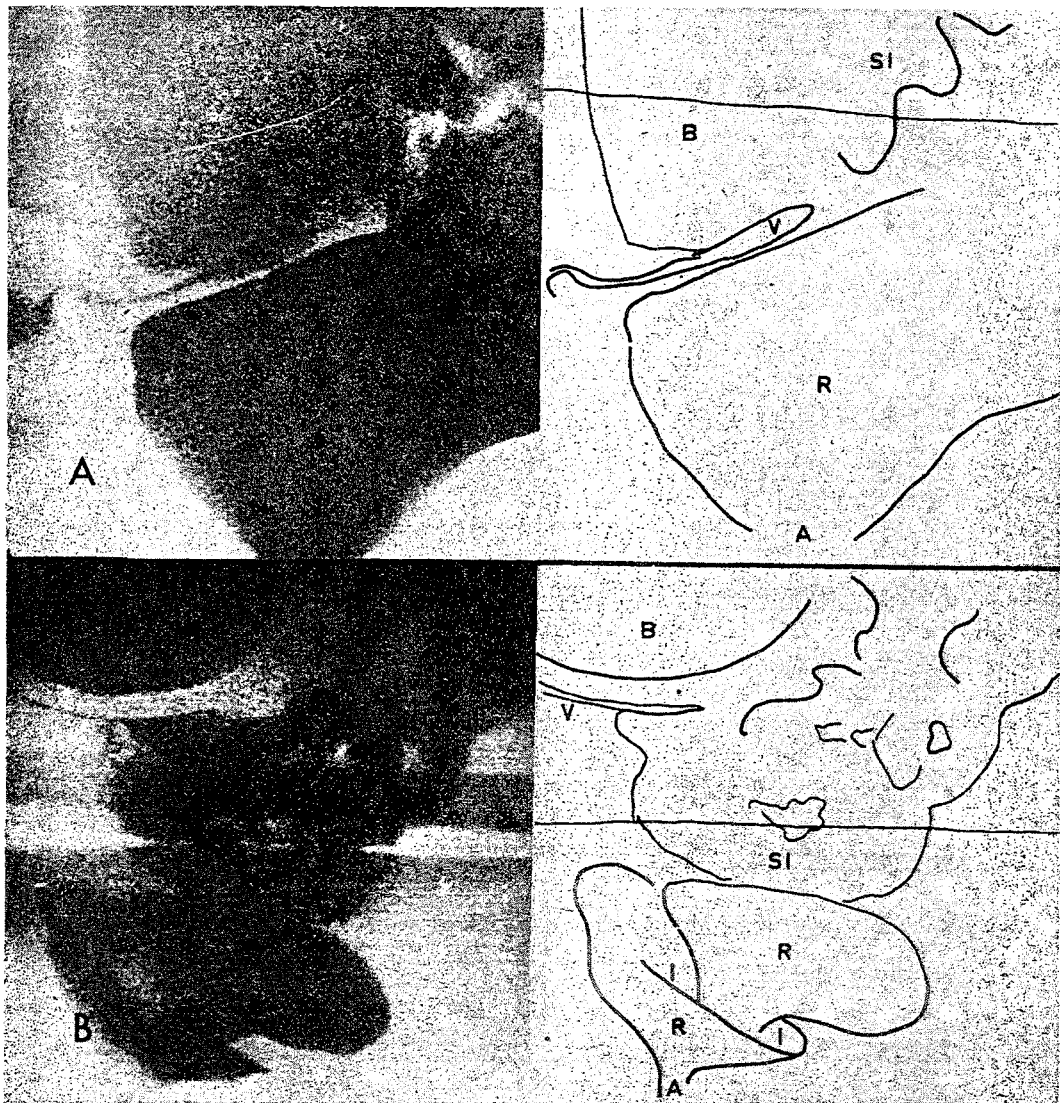
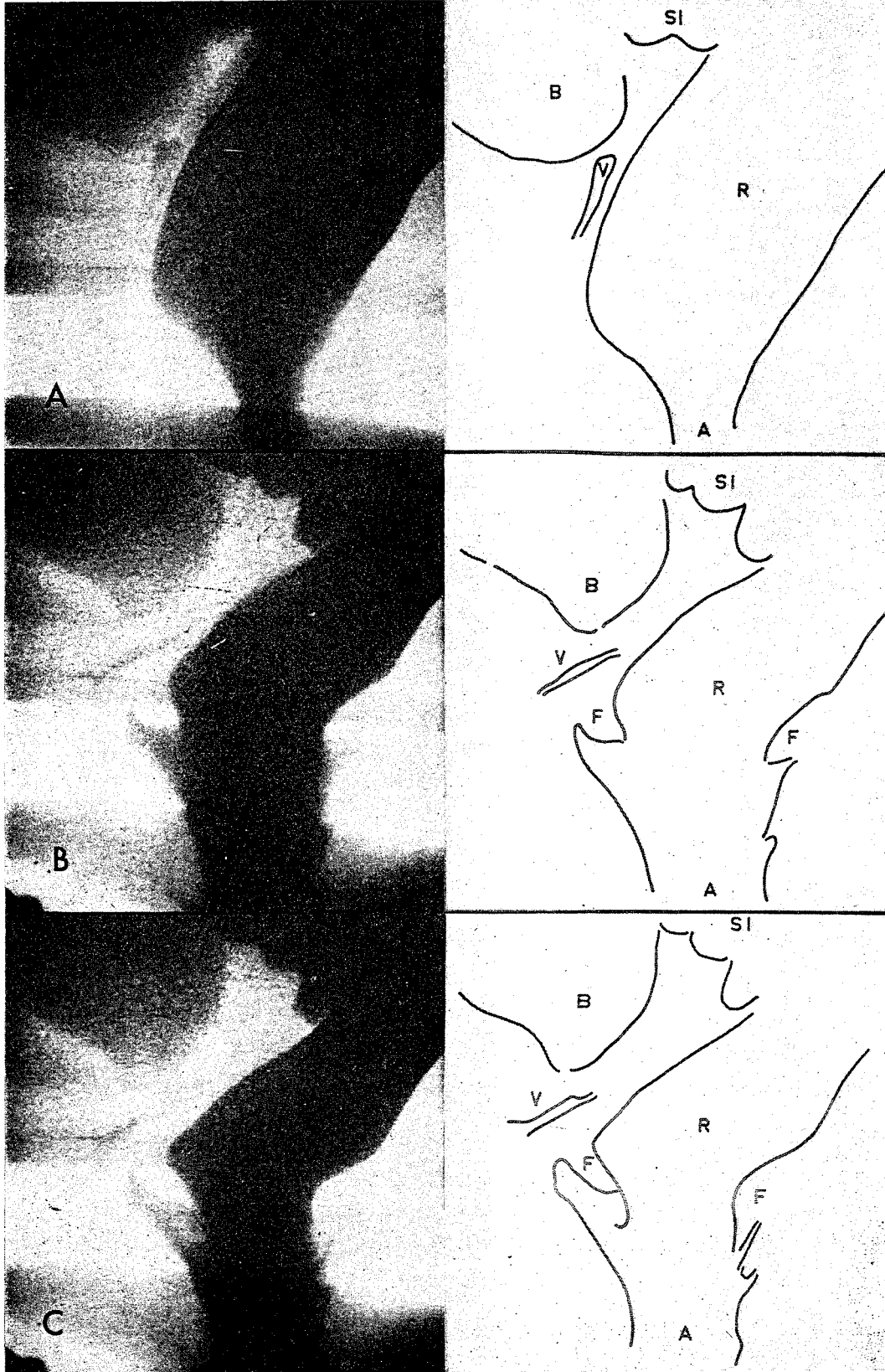
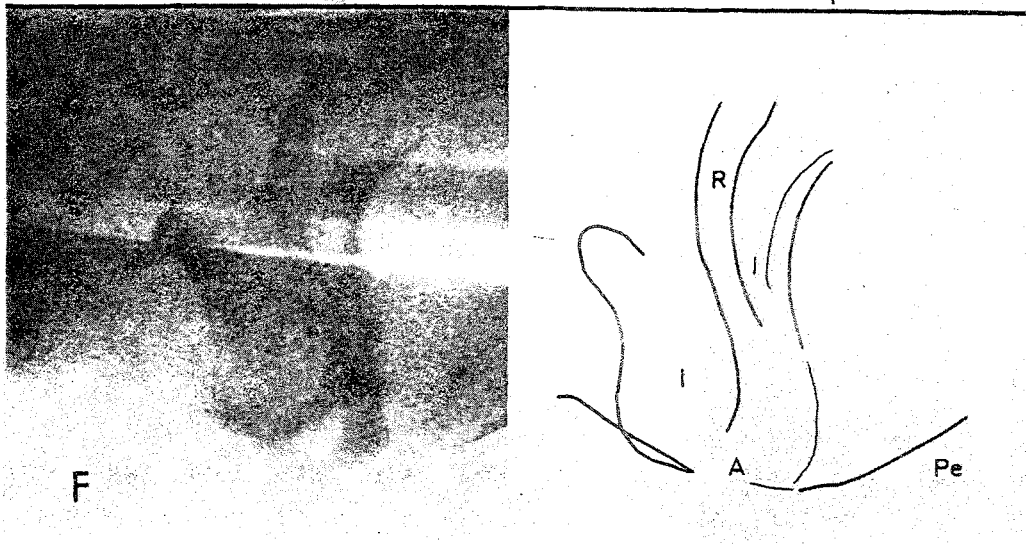
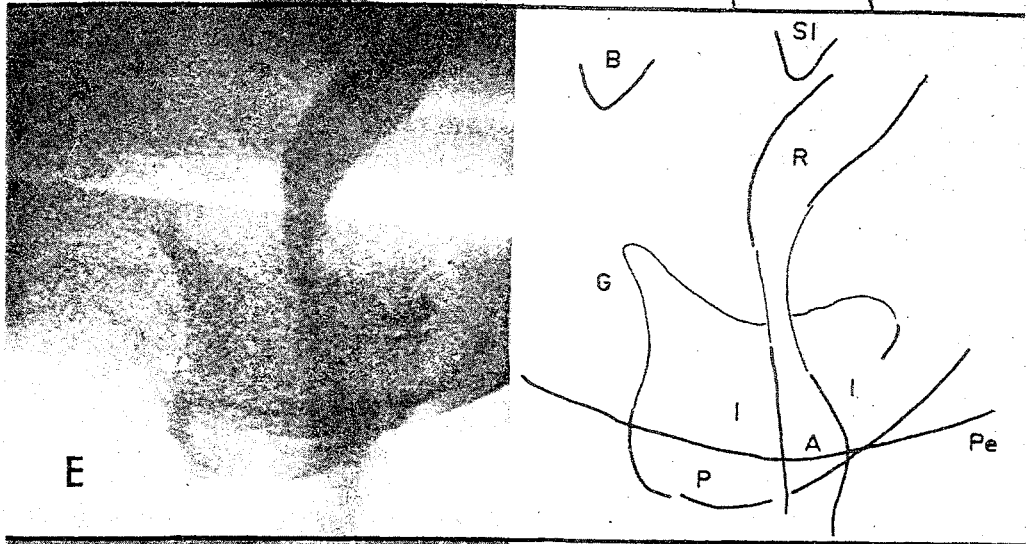
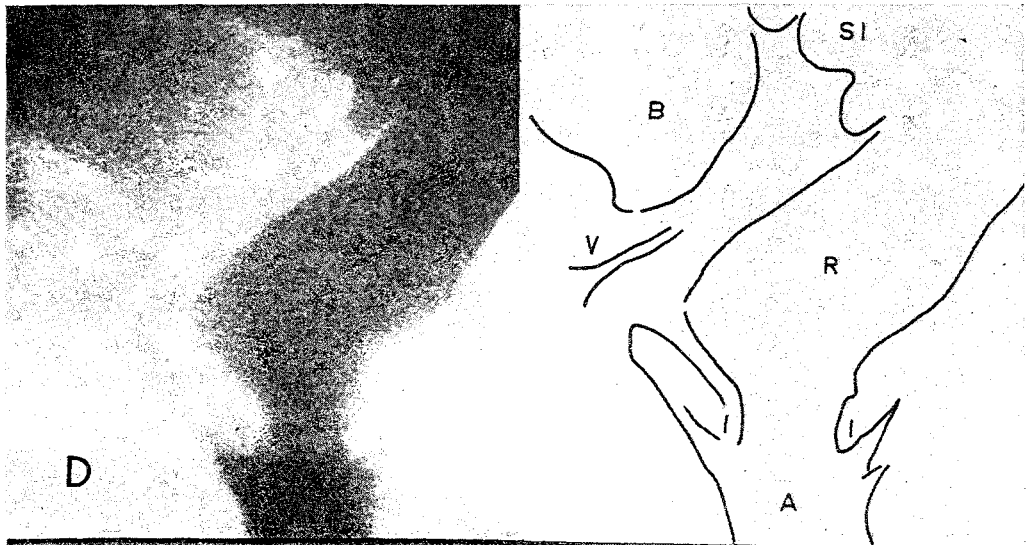


FIG. 5. Internal intussusception with enterocele in a 56-year-old woman. *a.* Before defecation. *b.* After defecation (while straining). Compare with Figure 8.





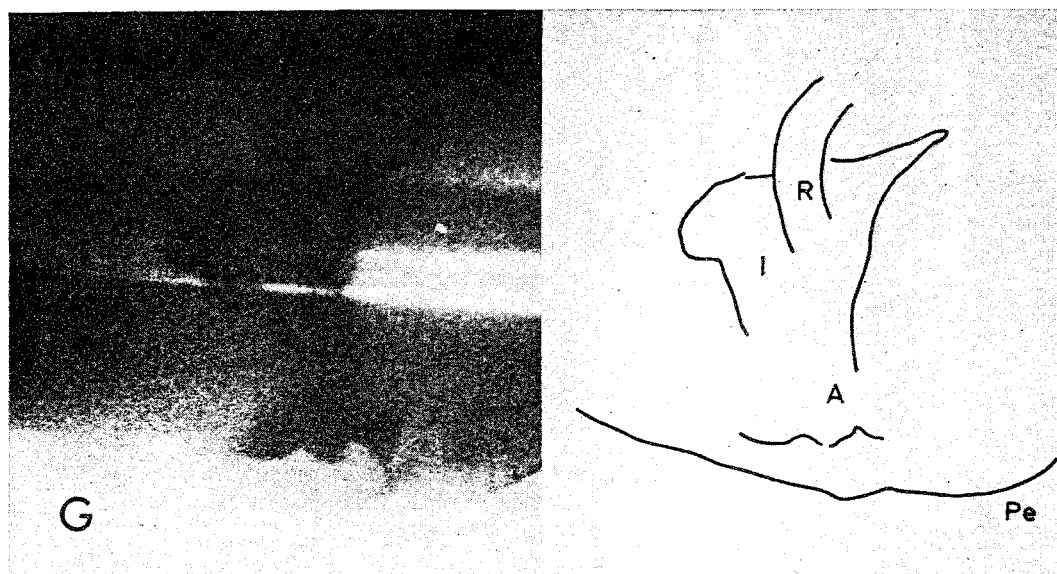


FIG. 6 (pages 336, 337, and above). Procidentia in a 58-year-old woman. On straining down, a fold was seen in rectal wall (6 to 8 cm up in the rectum); this deepened and gradually appeared as a distinct intussusceptum. On continued straining, the apex of the intussusceptum passed through the anus and procidentia developed (*e*). When the patient ceased to strain, procidentia was reduced spontaneously (*f* and *g*). This cycle of events was repeated on several occasions (compare with Fig. 7). When prolapse was maximal, there was nonprolapsed rectal wall inside anal canal. Contrast-filled groove between prolapsed and nonprolapsed rectal wall is circular (*e*). A = anus; R = rectum; V = vagina; B = urinary bladder; F = fold; I = intussusception; G = groove.

Results

Figures 1 and 2 illustrate procidentia with and without enterocele (conventional roentgen films).

In 54 cases, cineradiography of the rectum with the patient straining at stool disclosed different types of deformity of the shape of the rectum with or without procidentia:

Internal intussusceptum without enterocele (Fig. 3). In 16 cases we observed intussusception of the rectum beginning 6 to 8 cm up. On continued straining the intussusceptum descended toward the anus but did not prolapse through it.

Internal intussusceptum with enterocele (Figs. 4 and 5). In four patients we noted that, at first, intussusception started 6 to 8 cm up in the rectum, and later, on continued straining, small intestine was pressed into the intussusceptum like an enterocele. In one instance the intussusceptum and the enterocele formed simultaneously.

Procidentia without enterocele (Figs. 6 and 7). In 17 patients we observed that the intussusceptum, which formed 6 to 8 cm up in the rectum, descended on continued straining, prolapsed through the anal canal, and formed a larger or smaller procidentia.

Procidentia with enterocele (Fig. 8). In 11 patients, after the intussusceptum had prolapsed, small intestine entered the peritoneal pouch toward the pelvic floor on continued straining. In six, small intestine continued down into the procidentia.

Atypical Cases of Procidentia: In three cases, we found that small intestine descended into the enterocele simultaneously with prolapse of the rectum. In these three instances the procidentia protruded rapidly, without straining, when the patient sat on the examination seat. No distinct intussusception in the rectum was perceptible in these cases.

In two patients, no intussusception oc-

curred on straining down, but the prolapse seemed to begin in the anal canal itself. In these instances, the groove around the procidentia, noted in all the other cases, was absent. Enterocoele was present in one of these patients.

In no instance did we observe that rectal prolapse followed intussusception beginning at the rectosigmoidal junction, *i.e.*, 15 to 20 cm up in the rectum.¹⁵

We have observed a straightening of the rectum during straining, but our technic does not allow an exact measurement of the distance to the sacrum.

Discussion

The film technic permits detailed study of the deformity of the rectum caused by straining at stool in patients with procidentia. We have tried to illustrate the course of events by reproducing selected pictures from the films. Our observations agree in certain respects with the description given by Tuttle¹⁵ in 1903.

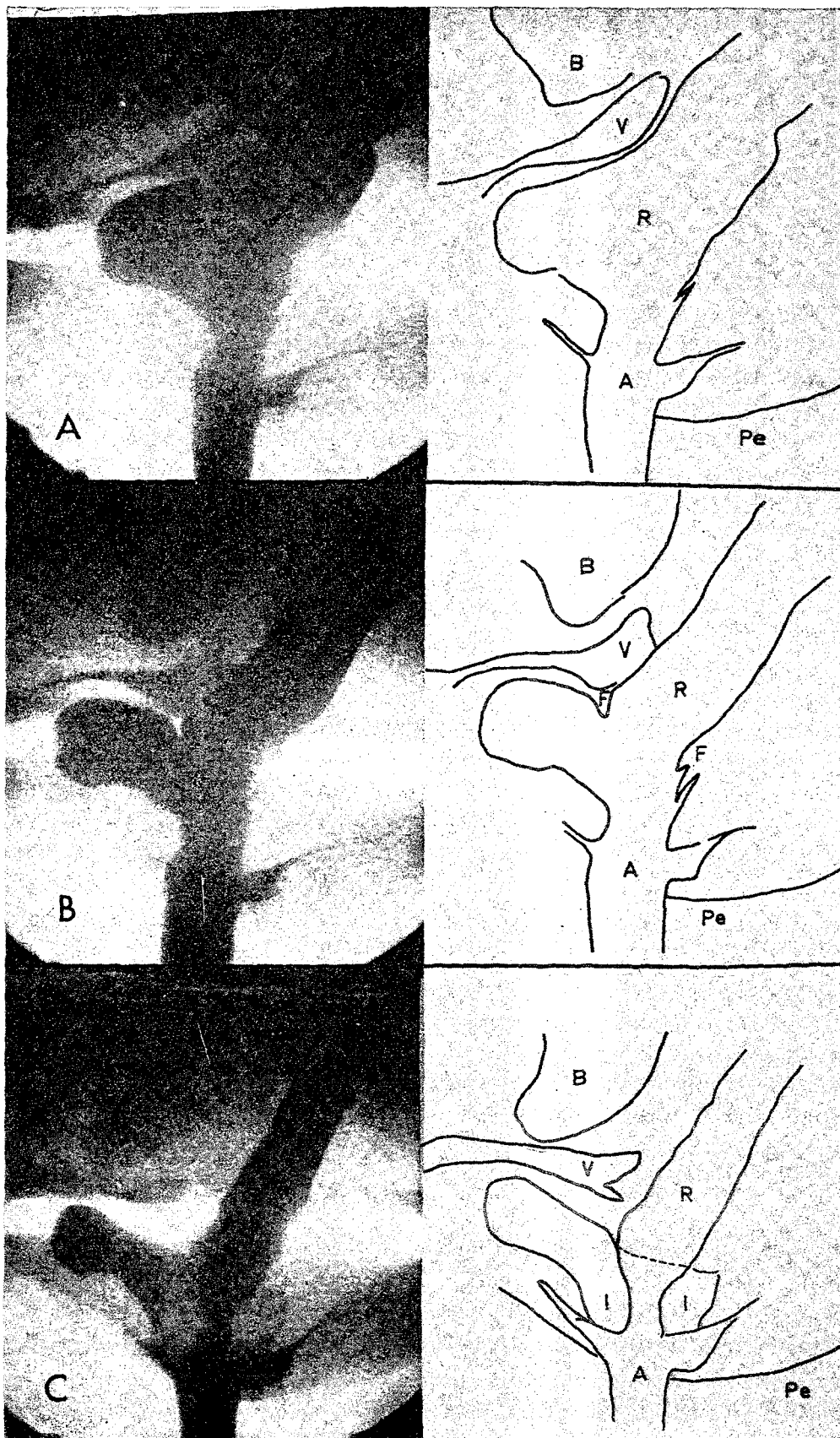
The first thing to be observed when the patient strains down is the formation of a circular fold in the intestinal wall, 6 to 8 cm up in the rectum. This fold deepens and forms a distinct intussusceptum which, on continued straining, advances toward the anal canal. In women, at the same time, a proctocele is formed in which the anterior rectal wall and posterior vaginal wall are united in normal extent. In order to study the relation between the lumen and the rectal wall, we fixed silver clips onto the mucosa, anteriorly and posteriorly in the rectum. One of these cases is illustrated in Figure 9. In many instances, continued straining forces the intussusceptum into the anal canal, which is then dilated (Fig. 3*d*). When the intussusceptum does

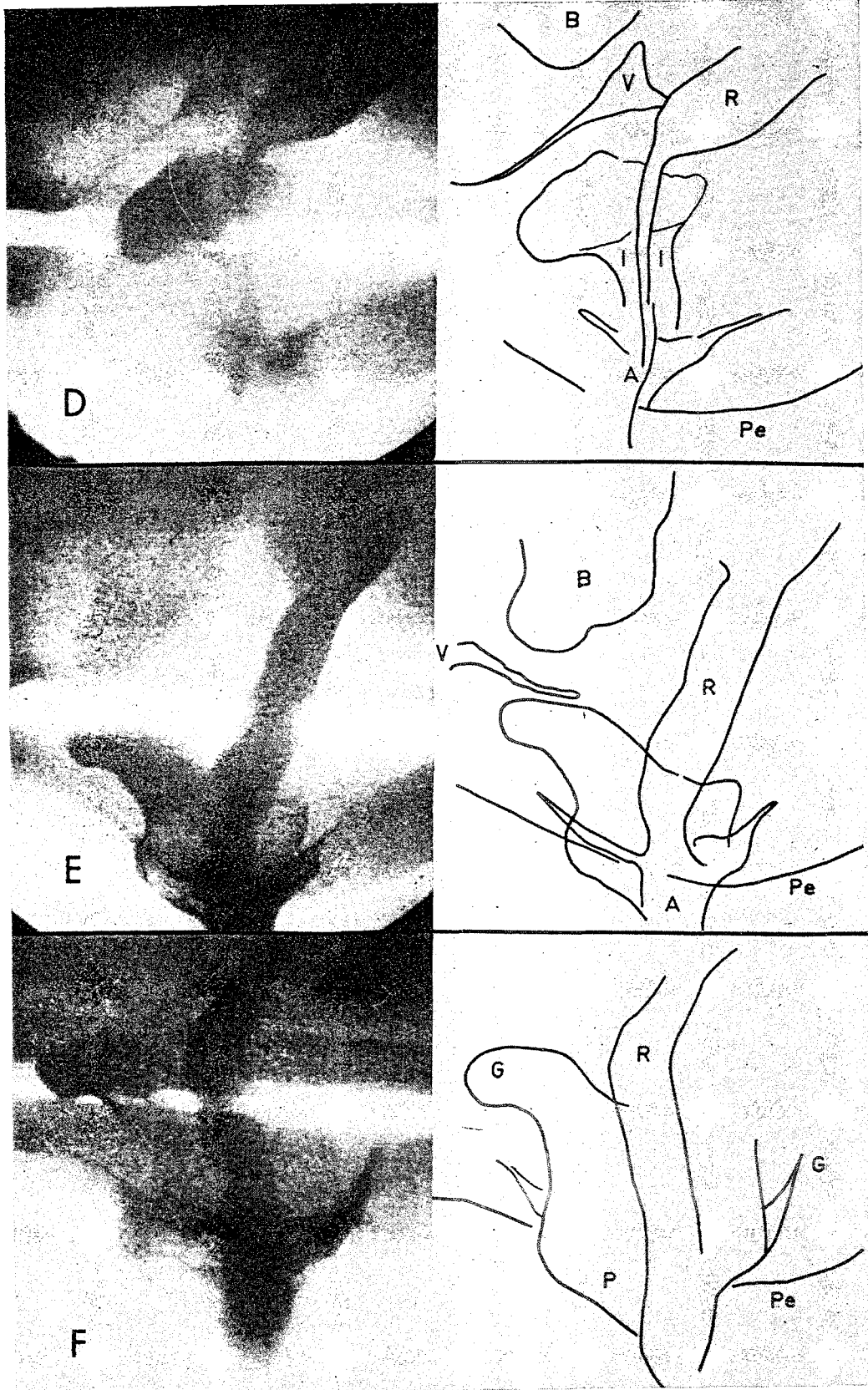
not pass through the anus, internal intussusceptum is present. Tuttle¹⁵ described a similar condition.

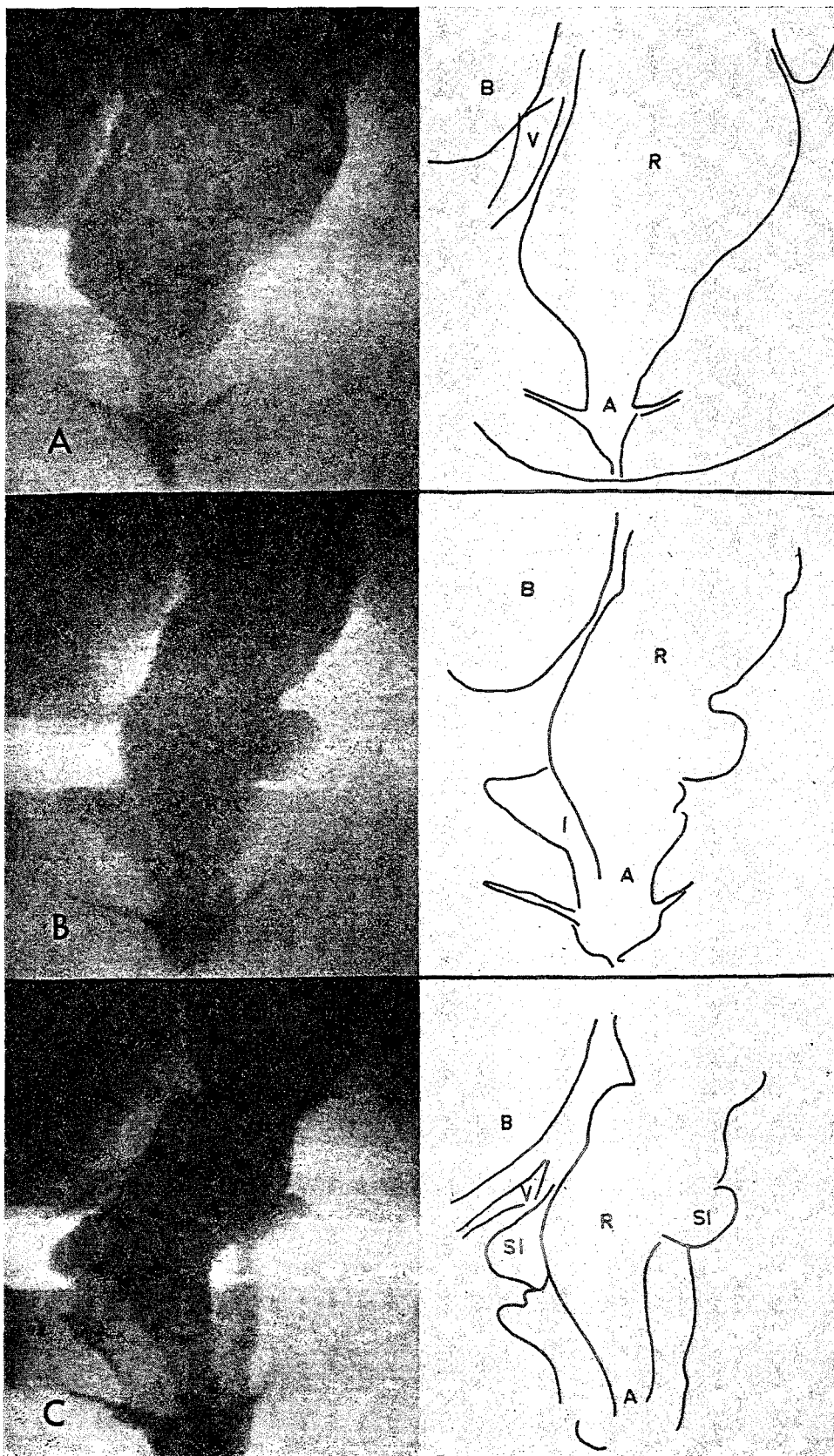
In patients with procidentia, the intussusceptum passes outward through the anus on continued straining. With few exceptions, it is then possible to see that contrast medium persists in a groove, 3 to 4 cm deep, around the procidentia (Figs. 6 and 8), which means that the mucosa of the anal canal and the distal portion of the rectal wall have not prolapsed. We noted prolapse of the anal canal mucosa in only two patients (see atypical cases). This last condition corresponds to Tuttle's first-degree prolapse. Therefore, only two of our 33 filmed cases of procidentia could have begun as anal and rectal mucosal prolapse.

The peritoneal covering is fixed on the anterior wall of the rectum above the peritoneal reflection. There is, therefore, always a peritoneal pouch in the intussusceptum and procidentia. The anterior and posterior walls of the pouch so formed consist of rectal wall from above the peritoneal reflection covered with peritoneum. Small intestine may enter this pouch at different stages and form an enterocoele (Figs. 4 and 8). Attention was drawn to this by Tuttle¹⁵ also. However, in all but three of our patients, this did not occur until after the intussusception and prolapse. The inference is that intussusception and prolapse are not caused by pressure of the small intestine of the anterior wall of the rectum. In these conditions, the enterocoele should not be confused with an abnormally deep rectogenital pouch because it is not situated between the rectum and vagina, with the exception of the part corresponding to the posterior fornix.

FIG. 7 (pages 340 and 341). Procidentia in a 33-year-old woman. Intussusception developed during defecation (*c*) initially perceptible as a fold 6 to 8 cm up the rectum. After repeated straining, the rectum prolapsed and was not reduced spontaneously when straining ceased. Thus, prolapse was preceded by intussusception which began in the middle of the rectum. A distinct groove encircled nonprolapsed rectum. A = anus; R = rectum; V = vagina; B = urinary bladder; SI = small intestine; F = fold; I = intussusceptum; G = groove.







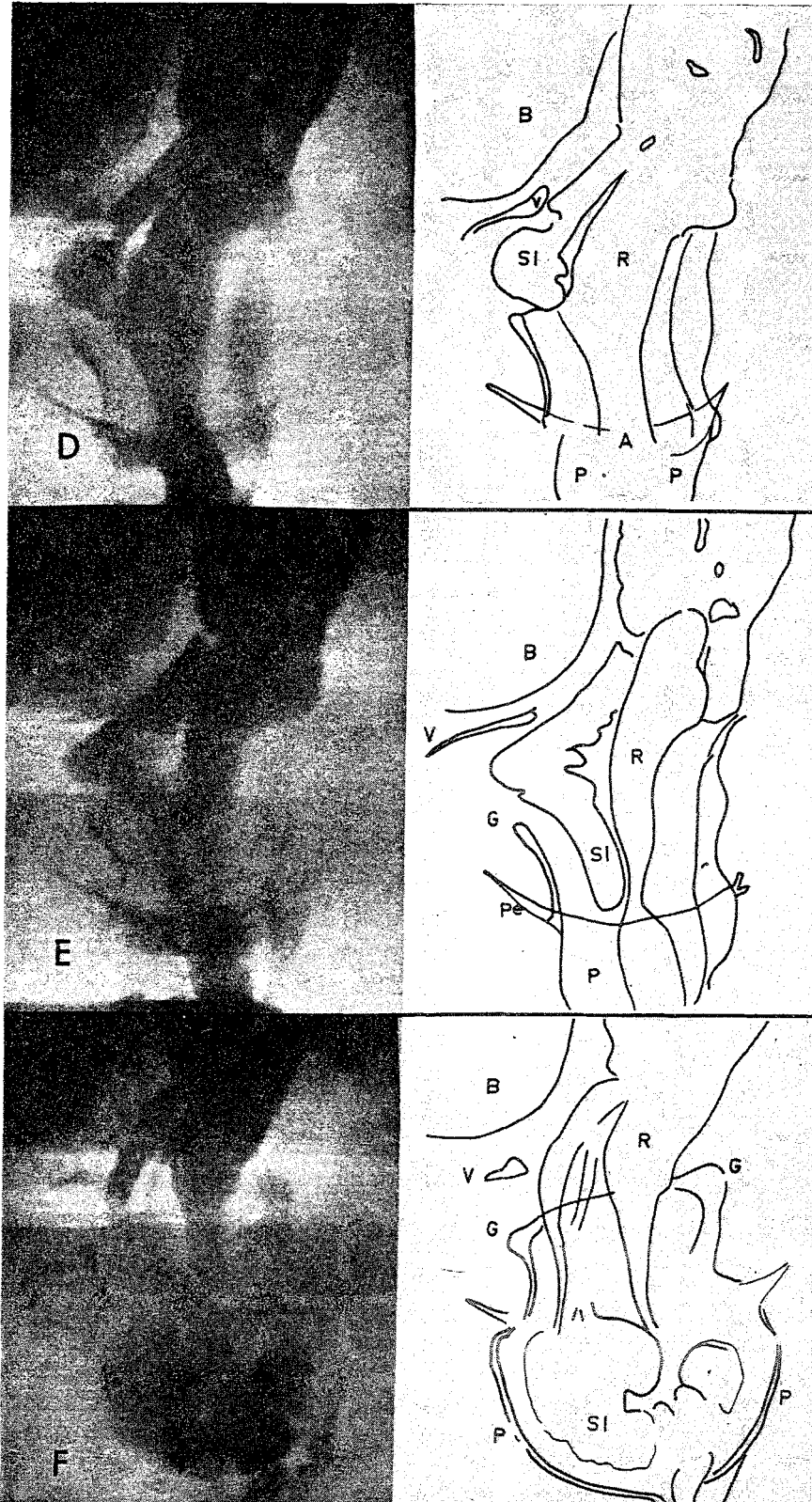


FIG. 8. Procidentia with enterocele in a 75-year-old woman. Prolapsed intussusceptum (*b,d*). Later, small intestine descended during straining (*c,d*), gradually advancing into a procidentia (*e,f*) which in-

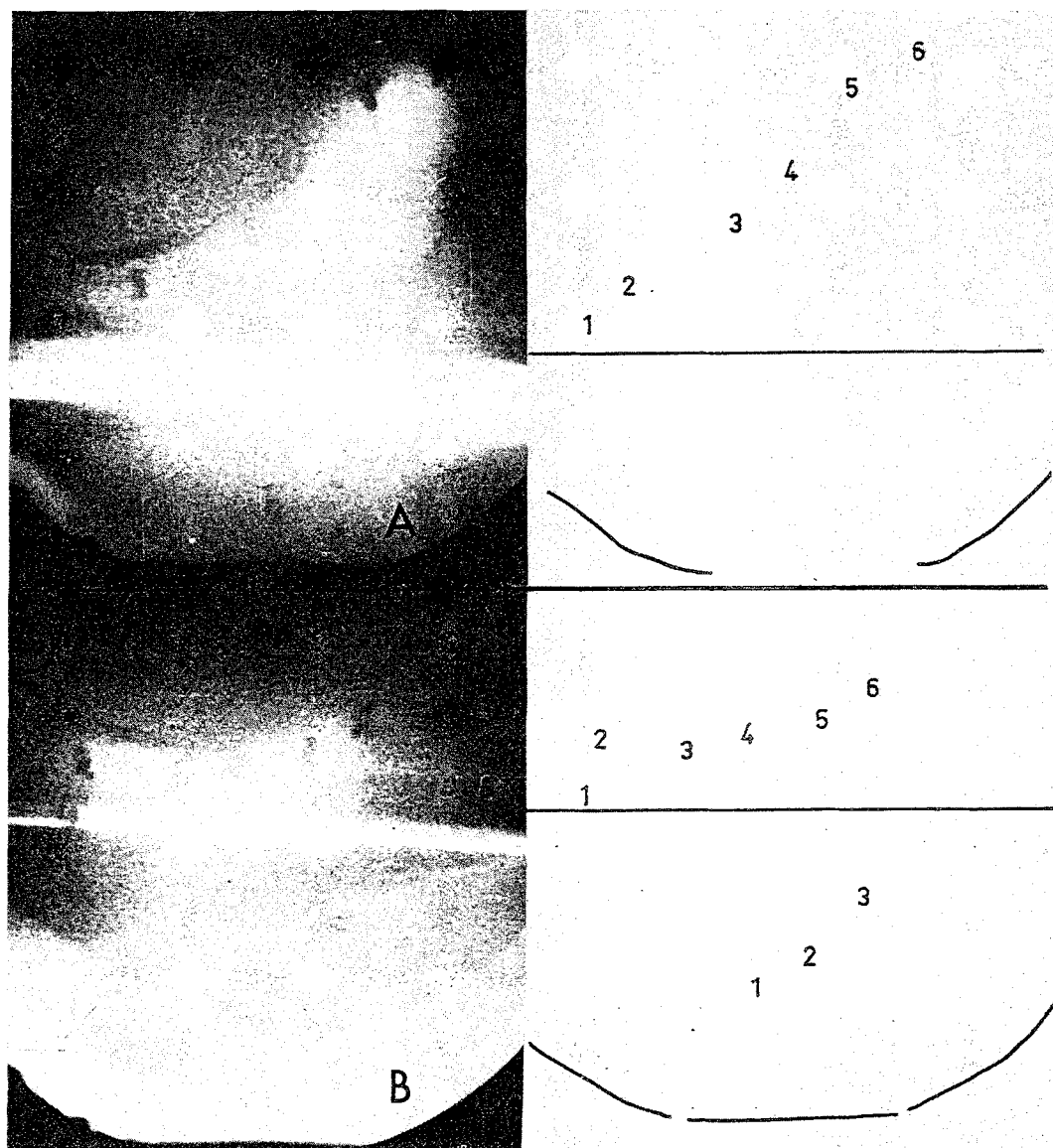


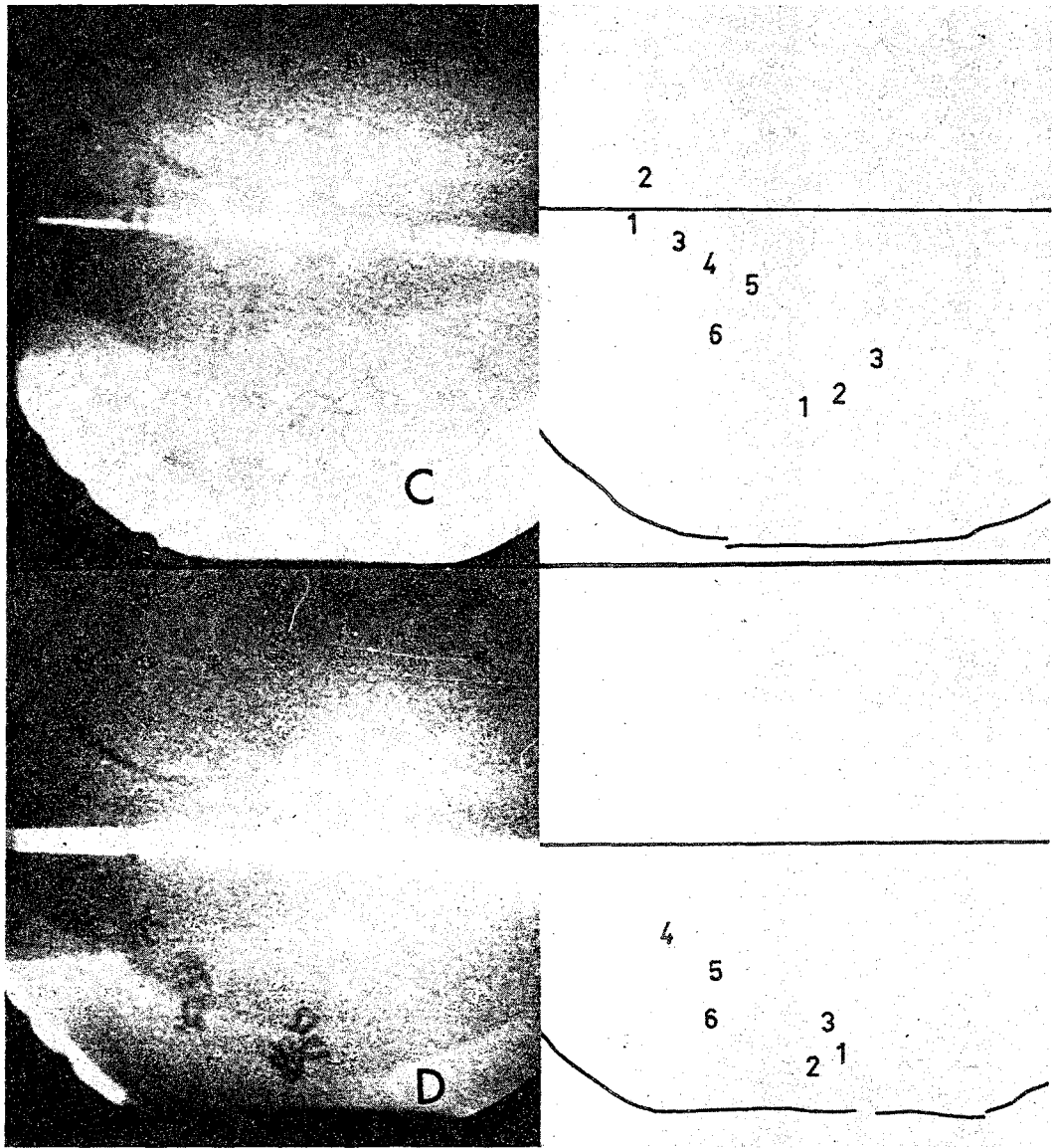
FIG. 9. Same case as in Figure 5. Anterior and posterior row of silver clips were placed as deeply as possible in rectal wall prior to examination. The rectum was filled with carboxymethylcellulose, which is not radiopaque. Movements of clips during defecation could be observed on film. In the drawings, the agraffes (clips) are numbered. Those originally placed highest up were close to the anus and rotated in

We have observed, in other connections, how the small intestine comes down in a pathologically-deep rectogenital pouch and presses the rectum dorsally (*i.e.*, defecation block).

In five of the 14 cases of procidentia with enterocele, the small intestine halted at the

level of the pelvic floor and did not descend into the procidentia, presumably because the anal canal was not dilated and lax.

In six of the 14 cases, small intestine entered the procidentia. The procidentia then changed in appearance. Its cylindrical shape, with the intestinal lumen at the top,



varying degree when defecation was completed, while those initially closest to the anus had not changed position to any great extent. Experiment demonstrated that intussusceptum seen on film (Fig. 5b) was formed by the middle portion of the rectum. A = anus; R = rectum; V = vagina; B = urinary bladder; SI = small intestine; I = intussusceptum.

became more spherical, the intestinal lumen was shifted dorsally and was seen some distance from the top, as was described by Tuttle.¹⁵ In our view, the presence of small intestine in the procidentia represents a more advanced stage, at which the intussusceptum has, for some time, stretched and

weakened the muscles of the anal canal and pelvic floor so that small intestine can pass down inside the intussusceptum. In several instances we observed that a patient had to strain down three, four or five times before the whole procidentia protruded (Fig. 7). In other cases the rectum pro-

lapsed only while the patient was straining and the procidentia was reduced spontaneously as soon as the straining ceased (Fig. 6). In these patients there was no weakness of the pelvic floor. The intussusception beginning 6 to 8 cm up in the rectum, which we noted in almost every case of procidentia, cannot be caused by weakness of the pelvic floor.

In three of the 14 cases, the entire procidentia, containing small intestine, protruded as soon as the patient sat on the seat and before straining was begun. In these patients, we had no chance of deciding whether the prolapse was preceded by intussusception. We believe these three cases have been the most advanced, almost certainly representing a very late stage (see atypical cases).

Thus, we found that when our procidentia patients strained at stool, the anatomy of the rectum underwent changes which, in most cases, followed a distinct pattern. First, intussusception was seen 6 to 8 cm up in the rectum. On continued straining, the intussusceptum advanced down to and through the anal canal and formed a procidentia. In a small number of patients, enterocele developed in the procidentia afterward.

It is our view that procidentia develops in the same way during the course of years. Our observations in 21 patients with intussusception of the rectum without prolapse support this assumption. We also have seen two patients with internal intussusception in whom procidentia developed after a couple of years. Our view is corroborated by the fact that patients with procidentia often report that they had particular symptoms from the rectum before it prolapsed. These symptoms are the same as those described by patients with internal intussusception. The internal intussusceptum stretches the muscles of the pelvic floor and anal canal for long periods, in many cases, before procidentia develops. Therefore, we

believe that the insufficiency of the pelvic floor and anal sphincter is, in most cases, caused by the internal intussusceptum and procidentia.

The weakening of the fixation of the rectum in the pelvis^{10, 15} which accompanies the internal intussusceptum and procidentia is the result of traction on the supporting tissues around the rectum caused by intussusception during straining. The straightening of the rectum can also be caused by the intussusception, which results in traction on the rectum trying to displace it from the hollow of the sacrum. We have not been able to show why intussusception begins just above the peritoneal reflection, but we assume that the reason is the weak support of the anterior rectal wall in this region.

Technical Features

Cineradiography has been necessary for the observations, in this work, of relations between internal intussusception and prolapse and between procidentia and enterocele. For routine work, with the aim of establishing if there is an intussusception during straining, or if a procidentia contains small intestine, it is enough to take ordinary roentgenologic pictures. Otherwise, it is important that the described technic be used and that progress during straining be observed with screening (television or viewing mirror) so that pictures can be taken with a suitable amount of contrast medium in the rectum.

Summary

The development of procidentia was studied by cineradiography of the rectum with the patient straining at stool. Procidentia is preceded by a stage of internal intussusception. This postulation is borne out by the following observations:

When a patient with procidentia strains at stool, the first thing that happens is intussusception of the rectum. The roentgen-

ologic appearances then agree with those of internal intussusceptum. On continued straining, the intussusceptum prolapses through the anus.

In two cases the internal intussusceptum developed into procidentia during the course of two years' observation.

For a longer or shorter period before the prolapse occurs, most patients with procidentia have symptoms similar to those associated with internal intussusceptum.

The intussusception, which is the beginning of procidentia, originates in the rectal wall at the level of the peritoneal reflection in the pelvis. The intussusceptum and procidentia contain a peritoneal pouch formed by the anterior rectal wall proximal to the peritoneal reflection. This pouch cannot be called a deep rectogenital fossa, as it does not develop between the rectum and vagina. The intussusception of the rectum is possible because the anterior wall above the peritoneal reflection has only weak support.

At different stages in the development of the intussusceptum and procidentia, small intestine may enter this pouch, but this does not cause prolapse. Small intestine in the pouch alters the appearance of procidentia. Internal intussusception is a precursor of procidentia. The intussusceptum often stretches and weakens the muscles of the pelvic floor and anal canal so that symp-

toms of insufficiency of these muscles may develop before the intussusceptum prolapses through the anus.

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