PILONIDAL SINUS: PRIMARY CLOSURE WITH EQUAL MUSCULOFASCIAL FLAPS AND REMOVABLE FAR-AND-NEAR SUTURES

ANALYSIS OF FIFTY-NINE CONSECUTIVE CASES*

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INFECTION, DEADSPACE accumulations of serum or blood, and a high incidence of recurrent disease are occasionally reported following the closed operation for treatment of pilonidal sinus. Although it has frequently been stated that *en bloc* excision with primary closure is the ideal treatment for small uncomplicated midline cysts and sinuses, because of these complications this technic has continued to find only limited application in the treatment of those sacrococcygeal lesions which have been complicated by recurring episodes of infection and perhaps the subsequent development of multiple sinus tracts. In a sense there is a reciprocal relationship between these postoperative complications. As it is notoriously difficult to obtain primary wound closure in the sacrococcygeal area in such a manner as to avoid hematoma or an accumulation of serum in the wound, the surgeon is occasionally tempted to remove a smaller block of tissue than would be advisable to insure complete removal of all lateral tracts. As a consequence, the incision is carried through diseased tissue, leading to potential wound infection. Further, even if primary wound healing does take place, recurrent disease may develop at a later date because of the failure to remove all of the sinus tracts.

The purpose of this paper is to present a successful technic of primary closure which allows an extensive *en bloc* removal of diseased tissue, and which at the same time will permit a safe and complete primary closure without undue tension. In this operation equal musculofascial flaps of *gluteus maximus* are mobilized as described by Holman,[2] but the use of buried suture material is avoided, and wound closure is obtained by means of removable far-and-near sutures of stainless steel. With this procedure it has been possible to reduce our recurrence rate to a minimum, to greatly diminish the number of wound-healing complications, and to shorten the total period of both operation and convalescence. This operation, in our experience, has also provided the patient with a thin, strong, nontender scar, and a protective pad of fat and fascia over the bony prominence of the coccyx and sacrum.

TECHNIC OF THE OPERATION

The patient is given a low-residue diet on admission to the hospital, and on the day preceding the operation the bowel is thoroughly cleaned out with appropriate cathartics and enemata. Spinal anesthesia is generally used. The operation is carried out with the patient in a prone position, with moderate flexion at the hips, and with the buttocks strapped apart with adhesive tape. The lesion and all its ramifications are excised *en bloc* by means of an elliptical incision which is carried straight down to the sacrococcygeal fascia. Care is taken to look for unusual extensions of these sinus tracts, such as the ones which occasionally extend down close to the anal orifice and those

* Submitted for publication May, 1954.

TABLE I. *Wound Healing and Postoperative Complications; Fifty-nine Cases of Primary Closure for Pilonidal Sinus.*

		No. of Cases
A. Primary wound healing. 52 cases (Sutures removed in 8–10 days)	(1) Uncomplicated wound healing	49
	(2) Minor wound infections not requiring reopening of wound (Seropurulent discharge from one or more retention sutures.)	3
B. Secondary wound healing. 7 cases (14, 30, 32, 39, 43, 59, and 75 days. Average — 42 days)	(1) Major wound infections requiring incision and drainage	2
	(2) Hematoma requiring evacuation of clots	4
	(3) Infected hematoma requiring evacuation	1
C. Additional postoperative complications	(1) Massive rectal hemorrhage from internal hemorrhoids on 6th p.o. day	1
	(2) Coccygodynia	1

which occasionally extend under the tip of the coccyx. All sinuses are probed, if possible, prior to this *en bloc* excision, to determine the extent of the lesion. All dissection is done with a scalpel. Cautery is not used, as it is desired to have as little necrosis as possible. Undercutting of the skin as well as undercutting of the subcutaneous areolar tissue away from the *gluteus maximus* muscle is avoided. Lateral V-shaped wedge excisions are occasionally added to the midline ellipse in order to effect removal of lateral tracts. When the area is cleared of all diseased tissue, hemostasis is secured through the use of hot packs, pressure and electrocoagulation. A few catgut ties may be necessary, but attempts should be made to minimize the amount of foreign body left in the wound. The specimen is then examined to see if removal has been complete. The fascia overlying the *gluteus maximus* muscle is now incised about 1 cm. from its attachment to the sacrum, coccyx and the closely invested sacrococcygeal fascia (Fig. 1). It is incised for the length of the wound, the incision being carried into the muscle to a depth of from 2 to 3 cm. Allis clamps are then placed on this layer, and traction is exerted to test the amount of mobilization which has been obtained. It should be possible to mobilize this fascial layer and some muscle across to the mid-line. As traction is exerted on the fascial layer, it will be observed that the overlying subcutaneous tissue and skin is also mobilized. The wound is then irrigated, first with normal saline solution and secondly with an antibiotic mixture such as penicillin-streptomycin or sulfamylon-streptomycin solution. Interrupted far-and-near sutures of stainless-steel wire (2–0 multiple-strand or 30-gauge single-strand) are now laid in the wound, catching both the skin and gluteal fascia in the same suture and also including a bite in the sacrococcygeal fascia in the mid-line of the wound (Figs. 2 and 3). Four or six such wires are usually needed for the ordinary case of pilonidal sinus (Fig. 4). When hemostasis is again secured the adhesive straps holding the buttocks apart are released and the wire sutures are partially tightened (Fig. 5). The skin is now completely closed with interrupted vertical mattress sutures of fine silk, concerted effort being made to obtain accurate coaptation of epithelium, particularly in the vulnerable inferior end of the wound, deep in the intergluteal cleft. Any remaining serum and antibiotic fluid is next expressed from the wound by means of a gauze roll, a clamp being inserted temporarily into one extremity of the wound in order to let the fluid escape. The wire sutures are now tied over two separate layers of gauze (Fig. 6), a pressure dressing is applied, and the buttocks are taped together with adhesive plaster and tincture of benzoin.

Postoperatively, the patient is instructed to lie on his stomach or his side, but not on his back. He is allowed to stand to void immediately after the operation but is requested to remain in bed most of the time

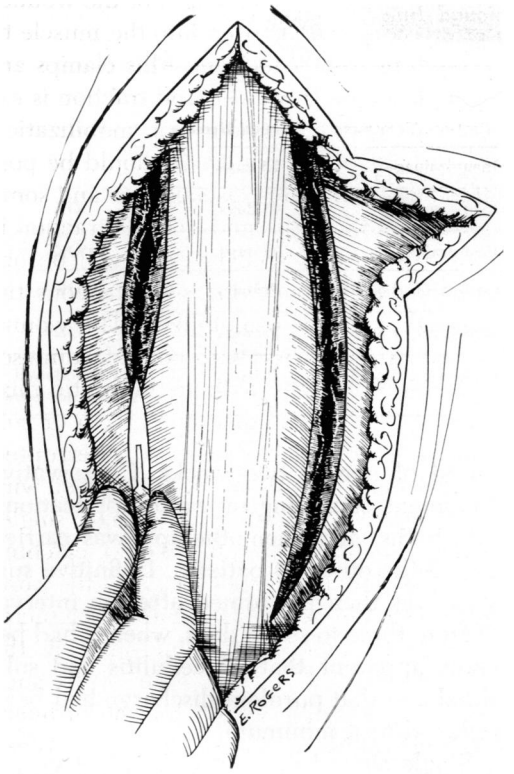

FIG. 1

during the first three days. A constipating diet is given. This usually has consisted of clear fluids *ad libitum* for the first two to three days, and a full-fluid diet thereafter. The patient is also given a teaspoonful of paregoric three times a day. On this regimen the patient does not generally find it necessary to move his bowels until the sixth or seventh postoperative day. Enemata, if necessary, may be ordered at this time. From the third to the ninth day he is permitted full ambulation, but is instructed not to sit down. Prophylactic doses of penicillin and streptomycin are given during the postoperative period. The wound is dressed on about the ninth postoperative day, and the sutures are removed. On discharge, the patient is advised to avoid unnecessary trauma to the wound area for an additional period of three weeks.

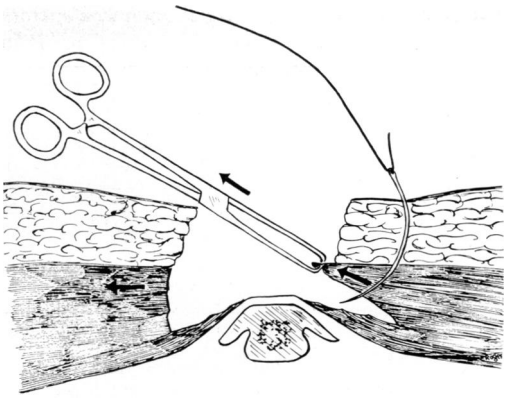

FIG. 2

CLINICAL MATERIAL

Seventy-one cases of symptomatic sacrococcygeal sinus were admitted to the hospital during the period of three years covered in this study. Fifty-nine unselected patients were treated by excision and primary closure with the technic as described above,* and 12 patients for various reasons were treated by other methods. It is the author's opinion that four out of this group of 12 could have been satisfactorily treated by excision and primary closure. Three additional cases could also have been treated by a closed technic after prior therapy of acute infection. In the other five patients it is agreed that primary closure was not advisable because of extensive lateral tracts in two, extensive involvement of the sacral area in one, and extensive lateral tracts with involvement of the perianal tissues in two. Of the group of 59 in which primary closure was carried out, 28 patients (47.5 per cent) had had previous surgical treatment for their disease. Definitive surgery had been carried out on one or more occasions in 12 (20.3 per cent), and incision and drainage had been carried out one or more times in 20 (33.9 per cent). These figures are mentioned, since it is our intention to emphasize the fact

* These 59 operations have been carried out by nine different members of the Surgical Service.

TABLE II. *Analysis of Six Cases with Postoperative Wound Infections Following Closed Operation for Pilonidal Sinus.*

		Acute Inflammation on Admission to Hospital	I & D Preop.	Post-op. Treatment	Wound Healing	Follow-up
Major wound infections	H. C.	0	0	Open drainage	75 days	OK
	D. B.	+	0	Open drainage	43 days	OK
	T. J.	+	0	Open drainage	39 days	OK
Minor wound infections: (Seropurulent discharges from suture holes)	L. U. T.	+	0	Antibiotics. Local heat	Primary	OK
	M. V.	+	+	Antibiotics. Local heat	Primary	OK
	H. A.	+ (also furunculosis)	+	Antibiotics. Local heat	Primary	Not followed (Address not known)

that our cases have been representative and unselected patients with symptomatic pilonidal sinus as would be seen in any Veterans Administration hospital. These percentages are, for example, similar to those quoted by Lawrence and Baker[3] in their larger series of cases treated by the marsupialization technic.

Twenty-seven patients, or 45.8 per cent of the total, showed evidences of acute infection on admission to the hospital. This consisted of erythema, tenderness, induration, or frank abscess in the sacrococcygeal area. As it is characteristic of symptomatic pilonidal cyst and sinuses to give a history of frequent and intermittent seropurulent drainage from this area, and as many patients also give histories of having had acute abscess formation which had either undergone gradual absorption, spontaneous rupture with purulent discharge or had required surgical incision and drainage, low-grade infection with purulent and bloody discharge from the sinus tracts was very commonly observed at the time of admission. Such drainage was not in itself considered evidence of acute infection.

Of the group of 27 who did show acute inflammation of the tissue surrounding the sinus tracts, incision and drainage was required in seven. In these instances the definitive procedure of *en bloc* excision and primary closure was carried out after an interval of one to two weeks. Conservative treatment consisting of warm applications, Sitz baths, and chemotherapy was carried out in the other 20 patients. Definitive surgery was then performed after an interval of from three to seven days, when it had become apparent that all cellulitis had subsided and that purulent discharge had been reduced to a minimum.

Single sinus tracts were found at operation in 21 patients, two sinus tracts in 17, three in ten, four in seven, and five or more in four.

WOUND HEALING

With but a few exceptions all sutures were removed in from eight to ten days, and pri-

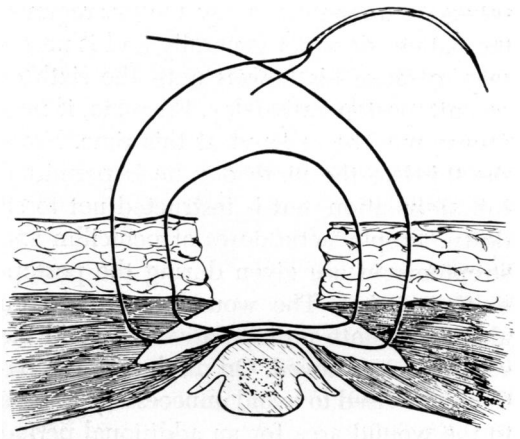

FIG. 3

TABLE III. *Results of Closed Operation for Pilonidal Sinus.*

Type of Follow-up	No. of Patients
Seen in clinic	44
Seen in clinic. (Cases done in past 3 months.)	5
Questionnaire only	6
Moved. No address	2
No answer to letter	2
Total	59
Percent followed	93.2

Length of Follow-up	No. of Patients
2–3 years	14
1–2 years	22
6 mos.–1 yr.	12
1 mo.–6 mos.	11
Total	59
Average time followed	15.5 mos.

Results of Follow-up	No. of Patients
Recurrences	4
Pilonidal sinus 2	(7.3% of pts. followed. 6.8% of total operated cases)
Granuloma with abscess 2	
Coccygodynia. Severe for 5 mos., gradual improvement past 7 mos.	1
Slight persisting tenderness	9
No symptoms except for mid-line numbness, particularly in first 6 mos.	41
Total followed	55

mary wound healing was obtained in 52 patients (88.1 per cent). Major wound-healing complications occurred in seven patients (11.9 per cent), as shown in Table I. There were five hematomas, one of which was secondarily infected, and two major wound infections. Healing by secondary intention took place in these seven wounds in an average of 42 days. This is about the length of time it takes for wounds to heal following marsupialization, or excision with partial wound closure. In three cases, or 5.1 per cent of the total, minor wound infections occurred consisting of seropurulent discharge from the far-and-near wire sutures. Reopening of the wound was not necessary in any of these three cases, and inflammation and drainage subsided within less than one week in all instances on continued antibiotics and application of warm wet dressings. All postoperative wound infections are separately analyzed in Table II.

In one case where sinus tracts had involved the perianal area, the most inferior extremity of the incision had been left open for purposes of drainage, the upper extremity of the incision being closed primarily. Complete wound healing was obtained in 21 days. This patient is considered to have had primary wound healing. Complete wound closure was carried out at the time of operation in all other cases.

Finally, there were six additional imperfections in wound healing which cannot properly be called wound-healing complications. They are listed for the sake of completeness and also to lay further emphasis on the necessity for obtaining a meticulous and secure closure of skin and subcutaneous tissue. These consisted of slight skin separations, 3 to 4 mm. in length in three instances, 1 to 2 cm. in length in the three other cases. In four cases this took place at the caudal end of the incision, and was probably the result of infolding of the epidermis at the time of closure. In the fifth patient at the time of the first dressing a portion of the gauze bolus was found to have been pushed down between the skin layers by the pressure dressing. In the sixth patient a small separation occurred at the junction between the mid-line elliptical wound and the lateral V-shaped wedge excision. A rather extensive procedure had been carried out in this instance because of the presence of eight intercommunicating sinus tracts. All of these minor defects in wound healing healed rapidly and did not greatly prolong the period of total hospitalization.

FOLLOW-UP STUDIES

Follow-up studies have been carried out in 55 of the 59 patients (93.2 per cent), as shown in Table III. Forty-nine patients re-

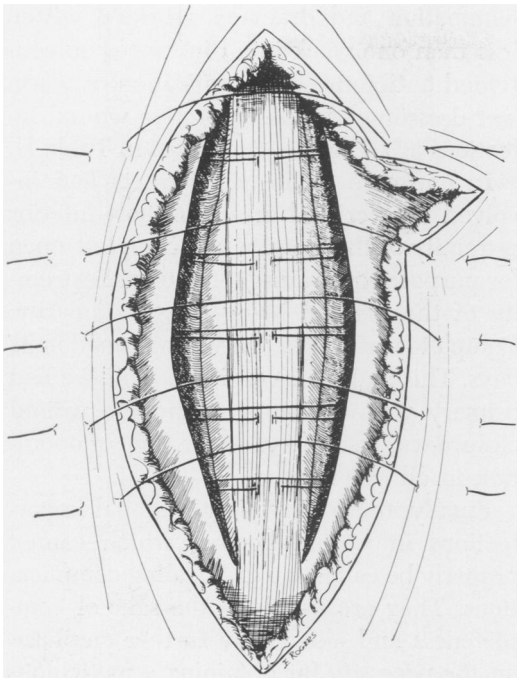

FIG. 4

turned to the hospital for examination, and six patients responded to a questionnaire. The average follow-up for the entire group was 15.5 months. Recurrent disease was found in four cases (6.8 per cent or 7.3 per cent of 55 patients followed). In three patients recurrence took place within three months after leaving the hospital. In the fourth patient, a bulldozer operator, a recurrent sinus tract appeared approximately one year following operation.

One patient developed a coccygodynia following operation. This resulted in moderately severe discomfort for about the first five months, but there has been progressively less discomfort in the past seven months. No explanation could be found for this complication.

The remaining patients were unanimous in their expressions of satisfaction as to the results of surgery. Slight tenderness in the wound area was present for a short time after surgery in a number of cases. Persisting slight tenderness has been experienced by nine patients. Numbness in the sacrococcygeal region was also a frequent symptom for the first few months after surgery, and has persisted to a greater or lesser degree in approximately one-half of the patients followed.

Without exception, physical examination in the 49 patients who returned to the clinic revealed the presence of well-healed, narrow, mid-line operative scars. The scars were also found to be completely mobile and separated from the sacrum and coccyx by an adequate pad of soft tissue.

DISCUSSION

Primary closure following excision of sacrococcygeal cyst and sinuses is more frequently carried out today than it was a decade ago. This has been due in part to the advent of modern chemotherapy, and in part to the introduction of the various musculofascial technics of primary closure. With antibiotics it has been possible to diminish both the incidence and the severity of postoperative wound infection, and by means of this plastic flap operation it has become possible to effect a more satisfactory obliteration of deadspace. The method of mobilization of bilateral equal flaps of *gluteus-maximus* muscle used in this operation is that described by Holman. Miscall and Holder[4] and Shute, *et al.*,[6] had previously described the mobilization of bilateral muscle flaps, but in their respective procedures the inner divided ends of the gluteal fascia were turned medially and sutured to each other in the mid-line over the sacral fascia, the lateral cut edges being brought together in the mid-line as a second layer. Pope[5] and Ziegler[8] had also previously described technics of primary closure in which unilateral sliding flaps of *gluteus maximus* and overlying fascia were used in order to effect obliteration of deadspace. Holman's technic of musculofascial mobilization seems superior to the others in that it more effectively obliterates all deadspace than does the two-layer method; and secondly, the development of bilateral flaps would

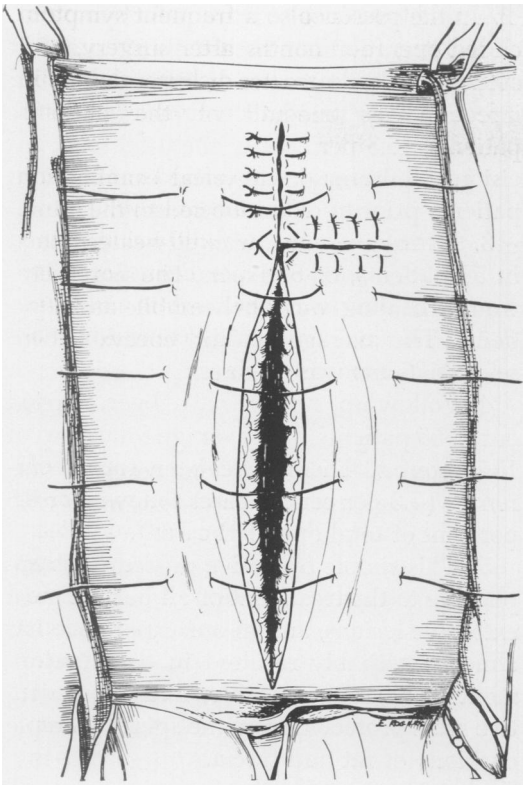

FIG. 5

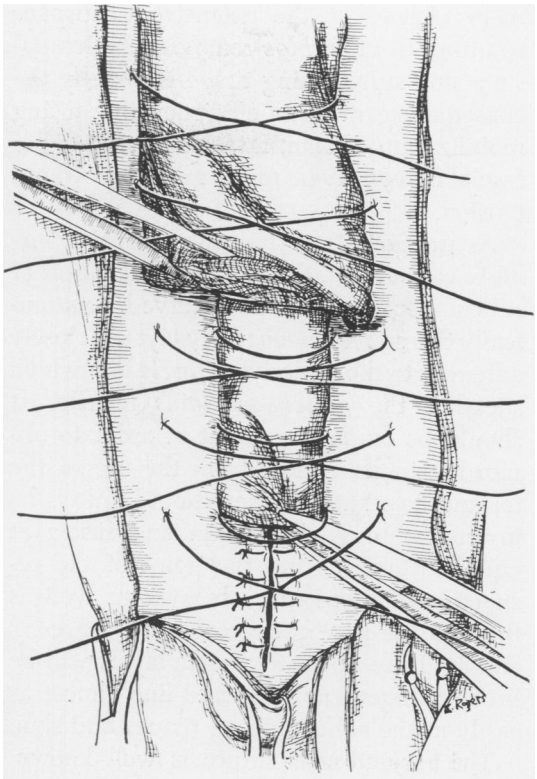

FIG. 6

seem to have an advantage over the unilateral flap technic by resulting in a more symmetrical wound with a more normal relationship of one gluteal muscle mass to the other. Certainly all of the 59 cases studied in this hospital have been striking in their absence of any deformity or of asymmetry of the normal soft-tissue configuration. Further, the mid-line sacrococcygeal wounds, after a period of several months, have been almost invisible.

We are of the opinion that the far-and-near suture technic plays a key role in the successful results which have been obtained with our operation. In the first place, it effects a more satisfactory deadspace obliteration than can be obtained by simple layer closure. Secondly, by using removable sutures, the amount of suture material left in the wound is greatly minimized, decreasing the likelihood of the development of silk sinuses or foreign-body granulomas.

There are certain surgical principles which are of obvious importance in the successful closed operation for pilonidal sinuses. These are: (1) complete excision of diseased tissue, (2) reduction of wound contamination to a minimum, (3) adequate hemostasis, (4) complete obliteration of deadspace, (5) accurate apposition of tissue layers, (6) avoidance of tension in the suture line, (7) limitation of motion in the vicinity of healing tissue. The first three points require no comment. However, the following four principles warrant comment inasmuch as the demands of these principles are most adequately supplied through the use of the far-and-near suture. There is a minimum of tension if these sutures are loosely tied, and by means of the double action on each layer in question the force of traction is distributed over a wide area, thus minimizing tissue necrosis. Their usefulness in effecting pri-

mary closure of the extensive deadspace resulting from *en bloc* removal of pilonidal sinus and surrounding tissue is directly the consequence of their efficiency in causing mobilization of skin, fat, and the musculofascial flap *en masse* to the mid-line without tension.

As traction is exerted on the untied far-and-near sutures, the ready mobilization of subcutaneous fat will be observed. Anatomically this subcutaneous fatty layer is closely adherent to the underlying *fascia lata* which sheathes the *gluteus-maximus* muscle. It should be emphasized that in order to obtain maximum benefit from the use of the far-and-near sutures, they should always be inserted through both skin and fascia at equal distances from the point of the respective incisions in each layer as well as through the sacrococcygeal fascia (Figs. 2 and 3). In so doing the fascia layers will be brought together in the mid-line almost as easily as the subcutaneous tissues and skin.

The far-and-near suture is well known, but apparently has not been widely used. It is said to have been used in Civil War days. Babcock has described it as a "combined relaxing and coapting suture, one of the best sutures for use where there is tension";[1] and the technic of its use in abdominal surgery has been described by Whipple and Elliott.[7]

SUMMARY AND CONCLUSIONS

1. *En bloc* excision, mobilization of equal musculofascial flaps of *gluteus-maximus* muscle, and primary closure by means of removable far-and-near sutures of stainless steel wire has been carried out in 59 patients with pilonidal sinus, representing 83.1 per cent of the patients admitted to the hospital with this disease in a period of three years. It is the opinion of the author that this procedure could well have been carried out in 66 patients, or 93 per cent of the total seen.

2. In the presence of acute infection, this closed operation has been deferred until all evidence of cellulitis has disappeared. Acute infection was present on admission in 27 patients, 45.8 per cent of the total seen. Incision and drainage was carried out in seven patients prior to definitive surgery.

3. Primary wound healing was obtained in 52 patients, or 88.1 per cent. Secondary wound healing was obtained in seven patients. The average healing time for these seven patients was 42 days.

4. Follow-up studies have been carried out in 55 patients with average follow-up of 15.5 months. There have been four recurrences (7.3 per cent of cases followed or 6.8 per cent of total operated cases).

5. This simple operative procedure is applicable to the treatment of all but the most extensive lesions, and in our experience has almost invariably resulted in the development of narrow, movable, mid-line operative scars protected from the spine by ample cushions of fat and fascia.

BIBLIOGRAPHY

1 Babcock, W. W.: A Textbook of Surgery. W. B. Saunders Company, 1928, p. 604.

2 Holman, E.: Pilonidal Sinus—Treatment by Primary Closure. Surg., Gynec. & Obst., **83:** 94, 1946.

3 Lawrence, K. B., and W. J. Baker: The Marsupialization Operation for Pilonidal Sinus. New Eng. J. Med., **245:** 134, 1951.

4 Miscall, L., and J. S. Holden: Pilonidal Sinus; Method of Closure by Musculofascial Flaps. Mil. Surgeon, **93:** 457, 1943.

5 Pope, C. E.: New and Successful Closed Operative Procedure for Pilonidal Sinus. Arch. Surg., **52:** 701, 1946.

6 Shute, F. C., Jr., T. E. Smith, M. Levine and J. C. Burch: Pilonidal Cysts and Sinuses. Ann. Surg., **118:** 706, 1943.

7 Whipple, A. O., and R. H. E. Elliott, Jr.: The Repair of Abdominal Incisions. Ann. Surg., **108:** 741, 1938.

8 Ziegler, H. R., D. R. Murphy, Jr., and E. M. Meek: Pilonidal Cyst and Sinus: New Method of Excision with Primary Closure. Surgery, **20:** 690, 1946.