

## PILONIDAL CYSTS AND SINUSES\*

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THE HIGH INCIDENCE of pilonidal cyst or sinuses in members of the armed forces has resulted in this lesion becoming a major surgical problem in all military hospitals. In civil life, disability following treatment is usually not great, as the patient carries on his usual occupation during the greater portion of the healing period. A soldier, on the contrary, cannot undergo the extraordinary exertion of military duty with an unhealed wound. Healing often requires months, with the loss of many man-days.

In spite of much research, the etiology of these sinuses is not clear. Stone<sup>33</sup> notes a similarity to the preen gland of certain birds. Kallet<sup>18</sup> suggests an embryonic rest of a vestigial secondary sex gland. Tourneaux,<sup>34</sup> Herrmann,<sup>34</sup> Mallery,<sup>25</sup> and Gage<sup>16</sup> believe the cyst results from an abnormality in the development of the neural canal. Fréré<sup>13</sup> and Fox<sup>15</sup> stress an embryonic infolding of cutaneous epithelium. Kooistra<sup>20</sup> found evidence to support each of the latter two theories and states that no conclusive opinion seems justifiable.

There is also a great divergence of opinion regarding treatment. Among the ambulatory methods, the aim is to destroy the diseased tissue by physical or chemical agents. Anderson<sup>1</sup> injected chloride of mercury; Crookall,<sup>9</sup> silver nitrate; Biegeleisen,<sup>2</sup> fuming nitric acid. Cutler and Zollinger,<sup>10</sup> and, later, Block and Green<sup>3</sup> report successful results with a modified Carnoy's solution. Smith,<sup>31</sup> and, later, Turell<sup>35</sup> used roentgenotherapy on recurrent cases, with good results.

Kleckner,<sup>19</sup> in 1936, by means of a questionnaire from members of the American Proctologic Society, collected 4,609 cases. Of these, 4,231 had been operated upon by the open method, indicating that this was the method of choice among experienced proctologists. Cautery excision and open packing was first recommended by Stanton.<sup>32</sup> Rogers and Hall<sup>28</sup> and, more recently, Rogers and Dwight<sup>27</sup> have reported gratifying results with this method.

Following excision, closure of the wound has been advocated by many. Due to the difficulty of obliterating the dead space and of approximating the tissues, numerous methods have been described. Ferguson and Mecray<sup>14</sup> use a mattress suture of steel wire tied over a gauze roll on either side. Burgess<sup>6</sup> undermines the wound edges and uses silk retention sutures tied

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over a sponge or gauze. Gage<sup>17</sup> stressed the value of sea sponge pressure to obliterate the dead space. Recently, Dunphy and Matson<sup>12</sup> described a method of undercutting the overlying tissue from the sacral fascia to facilitate closure.

Lahey,<sup>21, 22</sup> after block excision, filled the defect with a pedicle flap obtained from over the gluteus maximus. Later he modified this procedure by using a flap attached at both ends allowing the defect of the gluteal region to granulate. Cattell<sup>7</sup> used a similar procedure but closed the space over the muscle by converting it from a crescent into a Y.

Brezin,<sup>4</sup> in order to remove the scar from the midline, used a U-shaped incision circumcising the openings of the sinuses within the U. A pedicle flap was then reflected and the cyst and sinus tracts dissected out.

MacFee,<sup>23</sup> and De Prizio<sup>11</sup> recommend a partial closure, suturing the skin edges without tension to the sacrococcygeal fascia. This leaves a small raw area which heals by granulation. Colp,<sup>8</sup> in 1929, and, recently, Van Alstyne<sup>36</sup> described a similar method except that the skin edges were in approximation. Buie<sup>5</sup> does not remove the floor of the sinus overlying the fascia, and sutures the skin edges to the membranous edges of the sinus. This subsequently undergoes a squamous metaplasia.

Recently, good results have been reported by numerous military surgeons with various methods of treatment. Among these are: Pickett and Beatty,<sup>26</sup> using excision and packing; Woldenberg and Sharpe,<sup>37</sup> excision and primary suture; Scott,<sup>30</sup> using buffered sulfanilamide locally with primary suture; and De Prizio,<sup>11</sup> employing the skin to fascia type of operation.

A survey of these cases, in the Eighth Service Command, by Colonel Coley, the Surgical Consultant, revealed no uniformity of opinion as regards treatment, the great desirability of improving end-results, and the necessity of reducing morbidity. In studying the material of the Brooke General Hospital, as a part of the above survey, it was found that from January to October, 1942, there had been 77 cases treated by surgical excision. Fifty-six had healed and returned to duty, while 21 were still under treatment.

Of the 56 healed cases, half of them had electrosurgical excision, and the wound packed, while the remainder were excised and closed by primary suture.

In the 28 cases closed by suture, 12 healed primarily in an average time of 19 days. Sixteen cases became infected with subsequent opening of the wounds. From then on, these were treated by packing and healing occurred in an average of 69 days.

In the 28 cases treated by open packing, the average time of healing was 77 days (Fig. 1).

The study indicated a lower average healing time for the closed case subsequently breaking down than for the case treated by the open method. In addition, the average healing time of all closed cases was 47 days as compared with 77 days for the open method.

On October 16, 1942, the closed method was adopted for all cases. Excision was by scalpel. Meticulous attention was paid to hemostasis.

Cotton or wire suture replaced catgut. Great care was taken to avoid undue tension and to eliminate dead space. Pressure dressings, as advocated by Gage,<sup>17</sup> were employed.

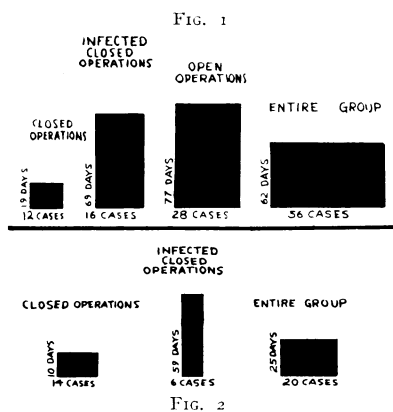


FIG. 1.—Average healing time of cases between Jan. 1 and Oct. 1, 1942.

FIG. 2.—Cases treated by excision and primary suture.

Twenty cases were treated according to this plan. Fourteen healed primarily in an average of 10.5 days. Six had postoperative infections, and healed by second intention in an average of 59 days. Cotton and steel wire were each used in 50 per cent of the cases. It seemed as if the wire wounds were superior (Fig. 2).

At this time, a new method of closure suggested itself to one of us (Frank C. Shute), which seemed to eliminate the difficulties of dead space and tension. A double elliptical incision is made in the skin surrounding the cyst and sinus tracts, and is carried down perpendicularly to the glu-

teal aponeurosis on either side. The block of tissue is dissected off the sacrococcygeal fascia and removed (Fig. 3). A lateral incision is now made through the gluteal fascia on either side, corresponding to the original skin incisions and is carried well into the muscle (Fig. 4). This creates an inner fibromuscular flap which is turned medially and sutured to its fellow of the opposite side. This fills in the area dorsal to the sacrum and coccyx eliminating the dead space (Fig. 5).

Cutting the fibers of the gluteus maximus mobilizes the lateral flaps so that it slides medially over the edge of the sacrum and can be sutured to the opposite lateral flap without tension (Fig. 6). The skin now falls together and is easily approximated (Fig. 7).

This method satisfactorily overcomes the difficulties of tension and dead space which are inherent in the other types of closure. In addition, the transplanted muscle furnishes an abundant blood supply to the base of the wound which is of great importance in healing.

Fifty-nine white males have been operated upon according to this technic. Most were in the third decade of life. The two outstanding symptoms were pain and discharge, while the objective signs were inflammatory induration, abscess or sinus formation. Not a single asymptomatic case was operated. Fourteen had abscesses which were immediately incised. The excision followed in an average of 8.6 days. Ten were recurrent cases and were prepared for an average of 5.6 days before operation. Thirty-five presented chronic infected sinus tracts and were prepared an average of 3.5 days. All cases were placed at rest and given hot sitz baths. No preoperative sulfa drugs were used. In some of our earlier cases the sinus tracts

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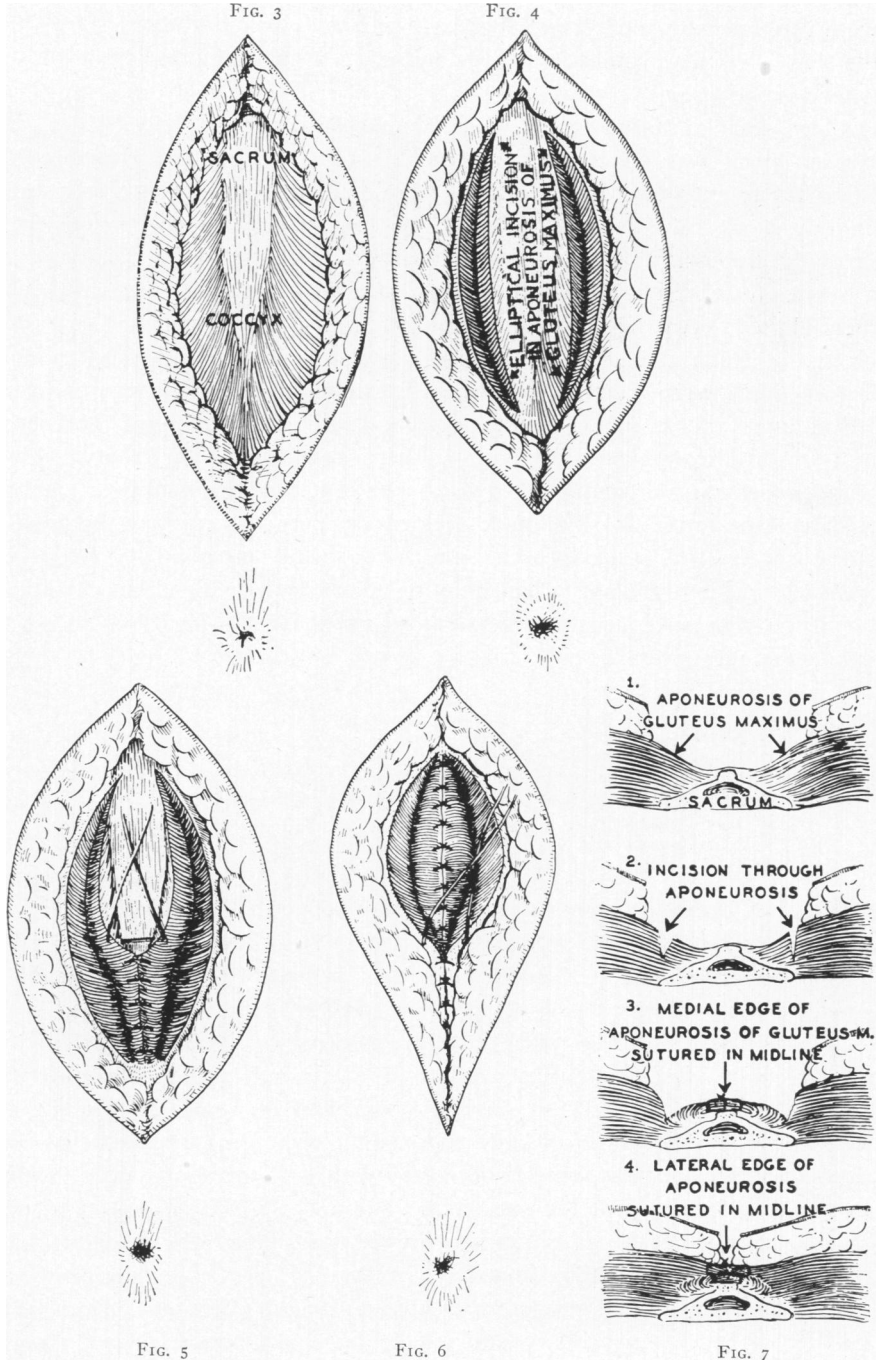


FIG. 3.—The sinus has been excised exposing sacrococcygeal fascia and the aponeurosis of the gluteus maximus.

FIG. 4.—An incision has been made on either side through the aponeurosis of the gluteus maximus. It is not necessary to join the incisions at the ends of the ellipse.

FIG. 5.—The inner fibromuscular flaps are being sutured together in the midline.

FIG. 6.—Approximation of the outer muscular flaps.

FIG. 7.—The steps of operation in cross-section.

were injected with methylene blue; but we found, as did Rogers,<sup>29</sup> in which the dye filled the lymphatic trunks and gave a false impression as to the extent of the lesion.

The block of tissue removed usually measured about 12 x 8 cm. The largest block was 15 x 10 cm. In this case, the wound closed easily. Sinus tracts extending into the thigh were dissected out separately from the midline block in a few instances. The bacteriology of the lesions were carefully studied. The excised specimen was brought to the laboratory in a sterile towel. Its skin surface was saturated with alcohol, which was then ignited. An incision was made into the infected area and a loopful or two of material was streaked on eosin-methylene blue agar and tubes of lactose broth were inoculated for the determination of coliform organisms. Blood agar plates, tubes of thioglycolate broth and milk, and beef heart infusion broth were inoculated for other organisms. The routine blood plate procedure was found to yield 46 per cent negative findings, whereas, thioglycolate broth or skim milk yielded 95 per cent positive findings of streptococcus and staphylococcus infections. The latter media were very satisfactory for organisms which required more or less anaerobic conditions.

Thirty-nine specimens were examined and the following types of organisms were encountered:

(1) No organisms found.....	2
(2) Streptococci (hemolytic—3; nonhemolytic—8).....	11
(3) Staphylococci (hemolytic—6; nonhemolytic—7).....	13
(4) Mixture of staphylococci (predominantly hemolytic) and streptococci.....	8
(5) Anaerobic streptococci.....	5
(6) Coliform bacteria.....	None

In the specimens from recurrent cases, no epithelial tissue was found. Only sinus formation as a result of infection in a dead space was noted. This is in keeping with Roger's<sup>29</sup> findings; and we believe the majority of so-called recurrences are the result of incomplete obliteration of dead space.

Postoperatively, these patients were given paregoric for three days then mineral oil. Enemata were administered as indicated. Patients were allowed to be ambulatory as desired at the end of 12 to 24 hours. The sutures were removed on the fifth to seventh day. Pressure dressings were abandoned because they were unnecessary with this operation. They seemed to cause invagination of the suture line.

The results in these 59 cases are most gratifying. Forty-eight healed in an average time of approximately eight days. Eleven cases had postoperative complications. Three were accidents and eight infections. One patient fell out of bed, opened his wound on the fifth postoperative day. Another had a fecal impaction, and separated the lower one inch of his wound on the sixth postoperative day. The third, an unusually active man, opened an inch of his wound on the second postoperative day. These were pulled together with adhesive and healed in 15, 16 and 15 days, respectively.

Of the eight suffering infections, three were minor stitch abscesses and five were infections of the lower perianal angle of the wound. These infected cases healed in an average time of 22 days. The healing time for the entire group was approximately 11 days. When healed, the enlisted men returned to duty after an average convalescent period of three weeks, while officers returned in 16 to 20 days following operation (Fig. 8).

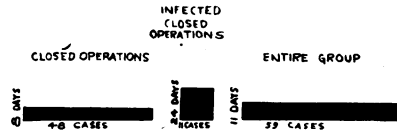


FIG. 8.—Cases closed by new technique.

The distributions with respect to time for healing are given in Table I, and curves showing the cumulative per cent of cases healing after various periods following operation, for the uncomplicated, infected and the combined series of cases, are shown graphically in Figure 9.

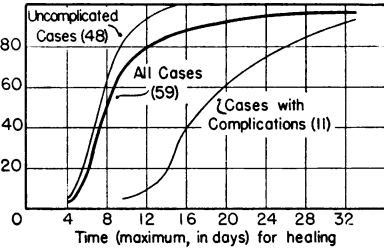


FIG. 9.—Curves showing cumulative per cent for periods of healing after excision of pilonidal cysts.

TABLE I  
PERIODS FOR HEALING AFTER EXCISION OF PILONIDAL CYSTS

Time for Healing, in Days	Uncomplicated Cases		Infected Cases†		All Cases	
	No.	%	No.	%	No.	%
3 to 5.....	3	6.2	..	..	3	5.1
5 to 7.....	13	27.0	..	..	13	22.0
7 to 9.....	21	43.6	..	..	21	35.6
9 to 11.....	8	16.6	..	..	8	13.5
11 to 13.....	2	4.5	1	9.1	3	5.1
13 to 15.....	1	2.1	2	18.2	3	5.1
15 to 17.....	..	..	2	18.2	2	3.4
17 to 19.....	..	..	1	9.1	1	1.7
19 to 21.....	..	..	1	9.1	1	1.7
21 to 23.....	..	..	1	9.1	1	1.7
23 to 25.....	..	..	..	..	..	..
25 to 27.....	..	..	1	9.1	1	1.7
27 to 29.....	..	..	..	..	..	..
29 to 31.....	..	..	1	9.1	1	1.7
Over 31.....	..	..	1*	9.1	1*	1.7
Total.....	48	..	11	..	59	..
Average time.....		7.8		21.8		10.6

† Includes three cases which sustained accidents.

\* Fifty-three days.

In the series of 48 uncomplicated cases, it will be noted that 90 per cent were healed in less than 11 days, and all of them in 15 days or less. Even in the 11 cases in which stitch infections or other complications occurred, 70 per cent were healed in less than 23 days, and 90 per cent in less than 30 days. For the entire series (59 cases) it will be noted that 60 per cent were healed in as short a period as nine days, 80 per cent in 13 days, and 90 per

cent in 17 days. The period of healing extended beyond 25 days in less than five per cent of cases, the latter including one case which required 53 days and another 30 days.

No. 38-gauge stainless steel wire was used in the wound for ties, and No. 32-gauge wire for sutures. In our hands, wire has produced less reaction in tissue than catgut or cotton. It is not used on account of its supposedly great tensile strength. As a matter of fact, the finer grades break readily if undue tension is applied. In the skin around the perianal region a subcuticular suture of wire is very satisfactory. In the remainder of the wound interrupted sutures were used.

Buffered sulfanilamide was used in the first 29 cases. It seemed to cause an excessive amount of oozing and serum in the wounds. Nine of the 11 complications occurred in these cases. In the latter 30 cases, in which sulfanilamide was not used, there occurred only two complications.

An accurate evaluation of end-results must, of course, await a more extensive employment of the method and the passage of further time. However, the many advantages of the operation, and its ready adaptability to war conditions, has led to its presentation at this time. None of the 59 cases have, so far, returned with a recurrence.

#### SUMMARY

The experience with pilonidal cysts and sinuses at the Brooke General Hospital is reviewed.

An operation is described which is found to be far superior to any previously used by the authors. A wide, double elliptical incision is carried perpendicularly downward to the fascia of the gluteus maximus. The circumscribed tissue block is separated from the sacrococcygeal fascia and removed. A lateral incision through the gluteal fascia in the line of the original incision is now made on either side. It is deepened into the fibers of the gluteus maximus and the fibromuscular flap thus created is turned medially and sutured to its fellow of the opposite side, in the midline.

This fills in the area dorsal to the sacrum, eliminates the dead space, and furnishes an abundant blood supply to the base of the wound. The lateral flap slides medially over the edge of the sacrum and is sutured to the opposite lateral flap without tension. The skin is now easily approximated.

Results of this technic in 59 cases are presented. Forty-eight healed primarily in an average time of eight days. Eleven cases had postoperative complications, and healed in an average time of 22 days. The healing time of the entire group was 11 days.

Bacteriologic examination of 39 excised cysts disclosed viable organisms in 95 per cent of the specimens. Nonhemolytic streptococci and hemolytic staphylococci constituted the predominating flora; in five instances only anaerobic streptococci were found, and it is interesting to note that coliform bacteria were absent.

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DISCUSSION.—DR. HARVEY B. STONE (Baltimore): Ever since Doctor Finney demonstrated a case of pilonidal sinus to my third-year class at the Medical School, I have been interested personally in this curious and provocative lesion. It certainly has been, in the last few years, provocative of a remarkable outpouring of publications, but that has not always been true. It was only about 16 or 18 years ago that I read a paper on this subject before the Southern Surgical Association, reporting a group of some 60 cases, and after the meeting was over, several widely experienced surgeons told me that they had known little or nothing about pilonidal sinus before and did not believe they had ever recognized a case, and several, not quite so frankly, said they did not believe that I had seen as many as I had reported.

I do not believe that the latter doubt will exist in anybody's mind now, after the numerous publications have come in and after the experience of Induction Boards and army surgeons with the really wide prevalence of this lesion.

There are a number of interesting problems—its embryologic origin; the reason for the defect in embryology which produces it; and the difficulty from the practical, clinical side in securing rapid, firm, and enduring healing after removal.

It is with the latter problem that Colonel Burch's paper deals, and I think there are at least three recognizable causes of trouble in securing desirable results: One is infection, and his emphasis on the spending of some time preparatory to operation in cleaning up an infection I think is a point of very great practical importance. A second is the complete and adequate removal of the lesion itself. A third is the dealing with the resultant wound.

So great has been the difficulty in dealing with the wound that a number of writers on the subject have frankly abandoned any attempt to close it and advocate that it be dressed open and left open to heal by granulation. Others have gone further, and have even abandoned attempts at excision and treat the lesion by some method of chemical or electrical destruction, in order to avoid an open wound altogether, and a great many have published papers describing various methods of plastic closure or suture, designed to obliterate the dead space.

This paper of Doctor Burch's I think falls clearly in this last group. Personally, I believe that closure should be undertaken, and that it is an unnecessary surrender to pack it open and wait for it to granulate. The reason that I feel so is because, as the statistics of Doctor Burch have shown and those of others who have advocated somewhat different plastic closures have indicated, where closure is attempted a considerable percentage of primary successes are obtained. That is "all to the good," and even where closure fails, and where the wound then has to be treated as an open wound and allowed to fill up by granulation, the period of deferred healing is probably less than if no attempt at closure had been made in the first instance.

So I believe we should accept the principle of an effort at closure, and that that effort entails some plan to obliterate the dead space. The dead space has a noncollapsible, bony floor. It has edges which are difficult to approximate without tension. Therefore, the introduction of any principle which will overcome these difficulties, which will help to close the dead space and bring together the wound edges in proper position for healing, so that they are neither inverted into the depth of the wound nor under great tension in being approximated, is highly desirable and is, I think, the sound principle to proceed on.

I think that Doctor Burch's method is ingenious, and that it is based on fundamentally sound conceptions. He certainly has presented a laudable record of success so far, and we all hope that he, and others, will give this method wider employment and report further as to its success.