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THE SO-CALLED PILO-NIDAL SINUS*

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THE CURRENT and generally accepted treatment of pilo-nidal suppuration‡ is based upon a theory of embryological origin. Textbooks of surgery use phrases such as: "most cases are congenital in origin";[1] "embryonic subcutaneous displacement of hair follicles";[2] "congenital fistula";[3] "remnants of an embryological structure known as the neuroenteric canal";[4] "pilo-nidal sinuses are congenital defects in the inter-gluteal fold".[5]

Thus some very extensive dissections and excisions of large blocks of tissue (in an anatomical site where healing is frequently delayed by infection) are performed in an attempt to remove a hypothetical epidermis-lined tract assumed to extend from the surface of the skin to a remnant of the spinal canal or alternatively to a remnant of the alimentary tract. As long as this view dominates our teaching, even more heroic attempts will be made to remove ever larger blocks of tissue in zealous attempts to eradicate this so-called congenital channel.

The results of this line of attack—for a condition which in its pre-treatment stage frequently causes only trifling disability—can be easily seen from a survey of the literature during the war years. The large number of papers on this condition bear witness to the difficulties encountered in the accepted methods of treatment. Most of the reports deal with the large volume of cases where primary excision failed, leading to further, more extensive dissections with prolonged hospital care and ending often with a further high rate of recurrence.

In 1944, from a review of American naval statistics, Rusher and Theis[6] reported that there were, from pilo-nidal suppuration, "nearly as many sick days as from appendicitis", and that hospital stay varied from 26 to 62 days. Stone[7] reported on a series of excision and primary suture with 25 recurrences out of 61 cases, a recurrence rate of 40%. Cattell and Stoller,[8] reporting on a series with wide excision and sliding skin flaps, had nine recurrences out of 40 cases, a rate of 25%. Wedder stated that, taking all methods into consideration, there were "25% to 35% recurrences in the best of hands."[9] Davies and Starr[10] writing on the latest and most heroic of methods—wide excision with a buttock rotation flap—stated that out of 25 cases, five (20%) required re-operation; while if primary healing is accepted as the criterion of success, there were 12 failures (48%).

Such dismal statistics naturally pose the question, Is it possible that our treatment may, in part, be responsible for such poor results, or that such prolonged disability may be partly iatrogenic?

A critical review of our position regarding pathogenesis, clinical factors and treatment is surely indicated.

RECENT VIEWS ON PATHOGENESIS

Patey and Scarff[11, 12] challenged the opinion that the lesion is congenital, and their view has since been supported by Hueston,[13] Currie, Gibson and Goodall[14] and by Davage.[15] These writers have emphasized the following observations:

1. In spite of the term "pilo-nidal" (hair-bearing or hair-growing), no one has ever clearly demonstrated by microscopic sections that the hairs do in fact grow out of follicles lining the suppurating tract. Such follicles as are seen in microsections belong to hairs growing out of the surface of the skin.

2. Hairs found lying within the tract or within zones of suppuration are loose, unattached dead hairs.

3. Hair found projecting out of the sinus opening is loose hair with the pointed end (the end furthest from the follicle) pointing into the lumen of the tract.

4. Lesions pathologically identical to the pilo-nidal sinus, occurring in the interdigital clefts as an occupational disease of barbers, have been described by Currie, Gibson and Goodall,[14] Hueston,[13] and Patey and Scarff.[11, 12] These interdigital sinuses—which by no stretch of imagination can be on an embryological basis—contain hair (customers' hair) and are sometimes for varying distances lined by epidermal cells as a downgrowth from the surface.

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‡The phrase "pilo-nidal suppuration" is used to include "pilo-nidal" cysts, sinuses and/or abscess formation.

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CLINICAL FACTORS

A critical survey of the clinical features of pilo-nidal suppuration reveals certain factors that deserve emphasis.

1. *Significance of age distribution.* The occurrence of pilo-nidal suppuration is sharply limited to a distinct age group of between 15 and 30, with a sharp peak of incidence between 18 and 27, and a very steep drop at the age of 30

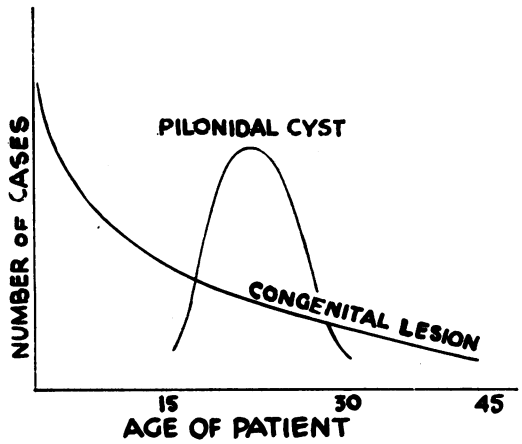

Fig. 1.—The age incidence of pilo-nidal suppuration is sharply restricted to between 15 and 30, with a peak incidence between 18 and 27. Compare with the curve of general incidence of congenital lesions.

(Fig. 1). Two inferences may be drawn from this:

(a) This age incidence is at marked variance with the curve of incidence of congenital lesions.

(b) Such a steep drop in incidence at the age of 30 must indicate a naturally self-limiting condition. There must be many individuals with pilo-nidal suppuration who seek no medical care, and yet the condition becomes excessively rare after the age of 30 and is almost never seen as a primary condition after the age of 40. It would be comforting to believe that this lesion whenever and wherever it occurs is so satisfactorily treated that all cases are cured by treatment; but unfortunately this belief is not consistent with experience, which shows a uniformly high recurrence rate after surgical treatment.

The only logical inference that can be drawn from this observation is that pilo-nidal suppuration is a self-limiting disease, and for reasons not yet understood never occurs after the age of 35. It further follows that when the lesion does occur before the age of 30, there is a strong natural tendency to cure—and furthermore that the lesion resolves by natural means soon after the age of 30. The only cases that persist for periods beyond this age are those which have been subjected to several operations, and, as already indicated, it is quite possible that the persistence is iatrogenic.

2. *Somatic types and sex distribution.* Pilo-nidal suppuration occurs most frequently in stockily built males who have a prominent distribution of coarse dark hair. These are the individuals who have a "five-o'clock shadow" at noon. There is clear evidence that seborrhœic activity and hair growth are functions of gonadal activity. The period of occurrence of pilo-nidal suppuration coincides with the period of active

Fig. 2.—Section at distal level of intergluteal cleft—showing a prominent postanal dimple. Note the leash of dense collagen fibres fixing the skin to underlying periosteum of coccyx.

seborrhœic change and active hair growth, as well as the period of maximal sexual development. In addition, these subjects are individuals with prominent gluteal development, and deep internatal clefts well endowed with hair in this region.

3. *The postanal dimple.* The occurrence of a dimple of the skin in the postanal region is frequently observed. The writer, while examining recruits during World War II, recorded some of the minor anatomical variations in the perianal region. Out of 3,136 male recruits, a distinct postanal dimple was observed in 287 individuals, an incidence of approximately 9%. A dimple in this region (Fig. 2) has the same significance as a dimple at other sites (e.g. cheeks, chin, sacral region or knees) and requires no torturing of embryology to explain its presence. Anatomically all these dimples represent nothing more than a local fixation of skin by dense collagenous fibres to underlying bone or fascia. However, the occurrence of a dimple at this site, associated with other factors, may be important in the development of pilo-nidal suppuration. This point will be dealt with further.

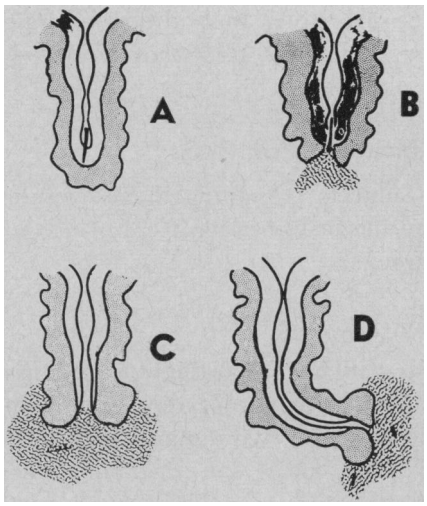

Fig. 3.—(A) Diagram showing a loose hair trapped at the bottom of a postanal dimple and beginning to penetrate epidermis by the sharp pointed end. (B) and (C) Successive stages of inflammatory reaction to the persistent foreign body. (D) Epithelization of a portion of the tract so formed. Note the hair lying loose in granulation and inflammatory debris.

4. *Hirsutism.* It is often seen that hair is broken off by friction against clothing. Thus, even in a hairy individual the lateral surfaces of the legs and other prominent parts subject to friction against clothes are frequently devoid of long hair—only short stubble persists. The same condition exists in hirsute individuals over the prominences of the scapular and sacral regions. It is altogether probable that some of these broken loose bits of hair find a more or less permanent resting place in the internatal cleft. Just as in the interdigital sinuses of barbers, so in this region short ends of hair trapped in an internatal cleft (perhaps facilitated by a postanal dimple and the retained sweat in such a region) may well present the traumatizing factor necessary to initiate pilo-nidal suppuration (Fig. 3).

The civilized practice of using toilet paper may contribute to the retention of broken ends of hair mixed with fæcal residue in the internatal cleft. In a person possessing a deep postanal dimple, the use of toilet paper in an anteroposterior direction may well serve to impact a paste made up of broken bits of hair plus fæcal material deeply into the dimple with each successive wipe. Davage[15] quotes from a personal communication from Dr. K. C. Samuel of the Department of Pathology at Jaipur, India, "Pilo-nidal sinus is very uncommon in India. Personal cleansing after defæcation is by ablution, and toilet paper is never used by the native population." Dr. V. L. Parmar,* in a personal communication to the author dated April 4, 1955, states:

"It is an invariable practice for all Indians to use water for cleansing after defæcation, and not toilet paper. Using of toilet paper is looked down upon as being very unhygienic, and in this country people always use water. These pilo-nidal sinuses and cysts are not common in this country, and although I have been attached to three general public hospitals during the last five years, I have not operated on more than three cases."

In the matter of prophylaxis with individuals subject to pilo-nidal suppuration, this triad of postanal dimple, loose bits of hair and fæcal residue is all-important. The additional traumatic factor of prolonged sitting, as among medical students or jeep drivers, may provide the final link in the chain of events leading to suppuration.

ANATOMICAL FACTORS

The local anatomy of the internatal cleft in the immediate area of the postanal dimple has an influence on the spread and persistence of an inflammatory process. The dense network of collagen firmly attaching the deep surface of the skin to the subjacent periosteum of the coccyx and sacrum is well illustrated in Fig. 4. The meagre fatty tissue in this central portion consists of a series of minute fatty cushions lying between the dense strands of fibrous tissue. In the lateral areas, however, the proportion of fat to collagen becomes reversed, and large areas of fatty tissue become interlaced with thin fibrous strands.

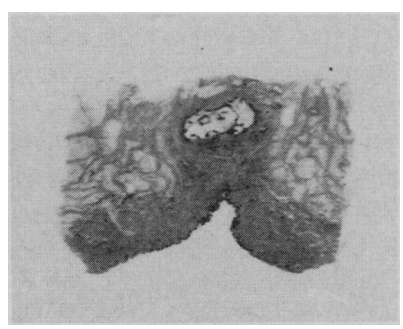

Fig. 4.—Section at level of postanal dimple. Note the sharp contrast of dense collagen at the site of the dimple with the loose fatty areas immediately lateral.

The density of the central zone of fibrous tissue is such as to produce, in the event of suppuration, an irregularly shaped area of inflammation with innumerable small zones of necrosis

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corresponding to the spaces previously containing fat. Extension into the loose lateral spaces, when it occurs, is in an irregular manner like so many pseudopodia. Once in this area, the extension meets little resistance from the thin fibrous strands. In the usual low-grade infection there is no way of determining on clinical grounds just how extensive these minute finger-like processes of infection may be. Most dissections leave behind tiny islands of infected necrotic tissue in the terminal portions of these extensions. Postoperative fibroplasia is more than likely to seal these off from the central zone, encouraging further and wider lateral extension. Thus the high rate of recurrence.

It is the complexity and irregularity of this spread into the lateral fatty zones that promotes chronicity, that eludes complete excision, that so frequently defeats primary suture, and that so often promotes recurrence.

The traumatizing factor of hair ends in creating the sinus is illustrated in Fig. 3. For a short distance along the tract so formed, a downgrowth of surface cells gives the appearance of a skin-lined tract. But this extends for a short distance only. The active inflammatory zone is a simple tissue space infection, very irregular in outline, without lining, and containing the debris of loose hairs plus granulation tissue or pus.

CONSERVATIVE TREATMENT OF PILO-NIDAL SUPPURATION

In 1947, after frustrating experience with the prolonged disability to service personnel during the war, resulting from pilo-nidal suppuration, the writer embarked upon the clinical experiment of treating all subsequent cases as conservatively as possible.

The following ideas were basic in the management of this trial series:

1. That the natural course of the disease was toward a spontaneous cure at somewhere between the ages of 25 and 30.

2. That a periodic small amount of discharge from a painless sinus was not disabling, was tolerable for the average person and, at any rate, preferable to extensive surgery.

3. That the immediate cause of the infection was a collection of loose hairs and fæcal residue in the internatal cleft and therefore local cleanliness seemed an obvious form of prophylaxis.

4. That in established suppuration with the development of tissue space infection, the aim was not excision, but rather the establishment of drainage according to traditional surgical concepts regarding the treatment of local suppuration.

CLASSIFICATION OF CASES

The subjects presenting themselves for treatment on the first occasion were placed in one of three groups:

GROUP I.

These patients, reporting for the first time, complained of recurrent discharge with either no discomfort or with minor discomfort from the resultant local skin irritation. They were advised that the condition was trivial and would lead to no disaster. The nature of the condition was carefully explained because it was felt that the prevention of infection was largely a matter of personal hygiene. They were advised to wash the internatal cleft carefully with soap and water at bedtime, dry the area thoroughly, and then apply witch hazel or alcohol to the area. They were further advised that this local toilette must be carried out daily until they reached the age of 30, at which time spontaneous cure could be confidently expected.

Results—Group I (Fig. 5)

There were 26 individuals in this group. None in this group has required hospital care, none has required surgery, and none has been disabled. Furthermore, none in this group has developed suppuration requiring re-classification into Group II.

Out of this group, 15 have been followed up for more than three years. Eleven of these have had no discharge for the last two years of the survey, while four have reported small amounts associated with prolonged sitting.

Out of the 11 who have been followed up for less than three years, eight have reported no further discharge up to the time of the survey, while three have had recurrent episodes of discharge without pain or irritation.

GROUP II.

Upon first examination, individuals in Group II had a well-defined abscess or tissue space infection, manifested by pain and a swollen tender area.

Treatment in this group was also as conservative as was consistent with accepted principles

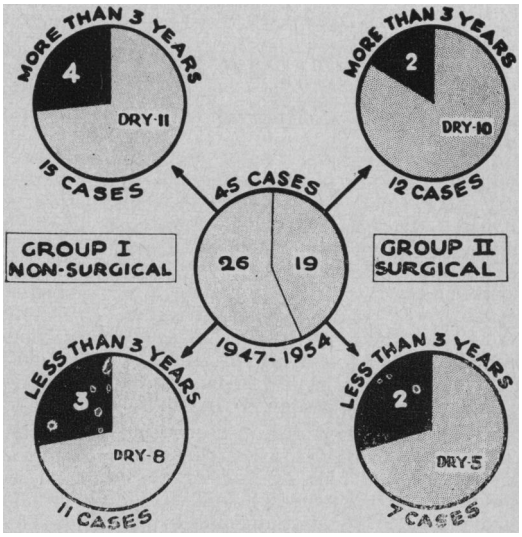

Fig. 5.—Results of treatment. The left side of the central circle shows 26 cases treated conservatively only. The arrows point to those followed for more than three years (upper left) and less than three years (lower left). The right side of the central circle indicates 19 cases requiring conservative incision and drainage only.

of treatment of acute localized suppuration. These patients were given antibiotics (the particular one varying to some degree with fashion), and advised to apply hot fomentations at home. In most, the abscess spontaneously discharged while at home, and in a few others, when the abscess was pointing and the overlying layer of skin became thin, an incision about ½-inch (1.25 cm.) in length was made in the office. Surgery was performed easily at this stage with no general anæsthesia. The abscess cavity was then loosely packed with ¼-inch iodoform gauze drain. At daily intervals about ¼-inch of the gauze was pulled out, so that in most cases the gauze was not completely removed until five or six days. After this, the aim was to keep the sinus open and the area clean. The patient was advised to wash the area daily with soap and water and to report to the office on alternate days and later at less frequent intervals, when a probe or the tip of a small Halsted hæmostat was passed through the opening of the sinus to make certain it remained open.

Results—Group II (Fig. 5)

Out of the 19 individuals in Group II, 12 have been followed up for three years or longer. Ten of these have had no recurrence of the acute suppuration, while the other two have required a second incision of an abscess; at no time were any of these 12 unable to work.

Of the seven followed up for less than three years, two have required incision on more than one occasion. In this group, two patients spent a total of four days in hospital—one was an intern for whom hospitalization was more a convenience than a necessity; the other was a patient sent directly into hospital from a rural area and was already an inpatient when first seen.

In both Groups I and II, no patient who reached the age of 30 has had a recurrence. The total period of hospitalization for both groups, namely 45 patients, was four days.

GROUP III.

This group, not within the primary aim of this study, consists of two cases previously subjected to major dissection for this condition. This had produced a dense, relatively avascular area honeycombed with sinuses. These two cases were treated in hospital by excision of all scar tissue and allowed to heal by secondary intention. In both cases healing was slow, but both were satisfactorily healed in 14 and 18 weeks respectively. Convalescence and disability in those cases that recur after extensive surgery are unavoidably prolonged. The primary aim of this paper is the prevention of these complicated recurrent cases.

SUMMARY AND CONCLUSIONS

1. A critical review of the literature reveals that there is very little support for textbook statements concerning the theory of embryonic origin of pilo-nidal sinuses and suppuration.

2. Recent studies indicate that pilo-nidal suppuration is due to a combination of factors in which body build, the postanal dimple, the trauma of broken hairs and problems of local hygiene play an important part.

3. Accumulated experience indicates, furthermore, that pilo-nidal suppuration is a self-limiting disease and that practically no fresh cases are seen after the age of 30.

4. Extensive dissections to remove in entirety a mythical congenital sinus have resulted in extensive scarring and prolonged hospitalization for a condition which in its primary stages carries a trifling disability. One is tempted to compare this state of affairs with the time when trifling degrees of varicocele were considered such a disability in the armed services that surgical excision was mandatory.

5. A series of 45 cases is presented in which conservative measures, as described, have re-

sulted in four days of hospitalization for the total group.

I am indebted to Professor Donald Bowie, of the Department of Anatomy, University of Manitoba, for his painstaking preparation of a large number of serial sections of a normal sacrococcygeal region of a 21-year-old male. Mr. Mel. Stover, Chief Technician of the Department of Anatomy, University of Manitoba, was responsible for the drawing of the illustrations.

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RÉSUMÉ

L'analyse critique des travaux sur les sinus pilo-nidaux et leur suppuration n'offre pas grand'confirmation à la théorie de l'origine embryonnaire de ces structures, telle qu'exposée dans les traités de médecine. Des études récentes indiquent que la suppuration pilo-nidale est causée par une combinaison de facteurs dans laquelle la constitution, la fossette coccygienne, le traumatisme des poils rompus et des problèmes d'hygiène locale jouent un rôle important. De plus, des expériences répétées indiquent que la suppuration pilo-nidale est une maladie qui s'arrête d'elle-même, et qu'on ne rencontre pratiquement aucun nouveau cas après l'âge de 30 ans.

Des dissections étendues pour enlever entièrement un sinus congénital hypothétique n'ont donné comme résultats que la formation de larges cicatrices et un séjour prolongé à l'hôpital pour traiter une maladie n'entraînant qu'une incapacité légère, au moins à ses débuts. On est tenté de comparer un tel état de choses au temps où on jugeait qu'un léger degré de varicocèle causait, pour le service militaire, une incapacité telle que l'exérèse chirurgicale était ordonnée.

L'auteur présente une série de 45 cas pour lesquels des traitements conservateurs décrits dans le texte donnèrent comme résultats quatre jours d'hospitalisation seulement pour le groupe entier. M.R.D.

CAPILLARY BLOOD FLOW IN PSYCHIATRIC PATIENTS AND ITS MODIFICATION BY STRESS*

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THE RECENT INTRODUCTION of a technique for estimating capillary blood flow directly in the vascular units of the nailfold skin[18] has not only enabled precision to be given to a hitherto obscure area of capillary physiology but also provided a methodology by which biological psychiatry can extend its knowledge of the role of anoxia in mental illness.[13] That stressor agents acting on the human organism are significantly related to the genesis of emotion in the organism is implied by the succinct definition of stress as change;[23] and that stress and emotional experience are accompanied by capillary anoxæmia is attested by studies on acral vasoconstriction[5, 6] and on blood oxygen saturation[3, 7, 8, 13, 14, 19, 22] and respiratory changes.[1, 11, 17, 24]

Emotion is sometimes considered (especially by physiological writers) as something essentially dramatic and overwhelming. Of course this may be so, but emotion includes also the ever-changing affect of even humdrum living, and its feeling tones provide the colour and the clothing of each thought, phantasy and activity of man. Because of this, emotion is constantly generated by environmental change, and stress is a matter of the repetitive experiences of perception. And because our world is one of colour, colour generates emotion; because again, speech is a characteristic of human activity, words act as stressor agents and similarly evoke emotional changes. It is not surprising therefore that when psychophysiological monitors are selected to pick up these emotional responses to verbal[19] and colour[20] stimuli, significant differences are found among the responses.

This paper is concerned with such verbal and colour stimuli, with the emotion differentially generated by the exhibition of these stimuli, and with one component of that emotion—the corpuscular flow within capillary blood vessels—acting as a quantifiable monitor in the sphere of oxygen metabolism.

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