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An Observational Study on Surgical Procedures of the Pilonidal Sinus Disease: Primary Closure, Healing by Secondary Intention and Limberg Flap Reconstruction

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ABSTRACT
The aim of the study is to assess the surgical outcomes of primary closure, healing by secondary intention and flap reconstruction after excision. This is an observational study done between the period of May 2022 to April 2023 at Basaveshwara medical college and hospital, chitradurga, karnataka. 60 consecutive patients were included in the study. Based on clinical presentation 5 patients underwent healing by secondary intention, 15 patients underwent primary closure and 40 patients underwent flap procedure. Mean follow-up was done for a months. Observations were made in terms of length of hospital stay, post operative pain, time taken to complete healing, time taken to return to work and post operative wound infection. Superior results were seen in patients who underwent flap reconstruction. In this study, limberg flap reconstruction was found to be effective.

INTRODUCTION

Sacrococcygeal pilonidal sinus disease has been known for a long time since the first ''official'' description by Abraham Wendell Anderson (1804-1876) dates from 1847[1]. The incidence is nearly 25/100,000. It occurs at least two times as frequently in men as in women, usually between the ages of 15 and 30., the disease occurs exceptionally before puberty or after 60[2,3] The ideal treatment method should take less time, less cost, have fewer postoperative problems, short hospital stay, quick return to work and have the least probability of recurrence[4]. This study aims to analyze the postoperative outcomes of the Limberg flap reconstruction, excision with primary closure and healing by secondary intention in the surgical management of sacrococcygeal PNS[5].

MATERIALS AND METHODS

This study was carried out on 40 consecutive patients with sacrococcygeal PNS who visited the Department of Surgery, Basaveshwara medical college and hospital, Chitradurga within the study time period of one year. The institutional ethics committee issued the approval for this study on 2/4/2022 for a period of one year. All the cases were thoroughly examined and investigated to be considered appropriate to be a part of this study. The patients were divided into two groups of 25 each (Groups A and B). Patients in Group A underwent Limberg flap reconstruction surgery, while patients in Group B, 10 patients underwent primary closure,5 patients underwent healing by secondary intention. The nature of surgical procedures was explained to the patients and informed consent was taken. Patients with recurrent disease, previously operated patients and immunocompromised patients, or patients with any other significant comorbidity like diabetes mellitus which may have altered the interpretations were excluded from the study. Preoperative care, anesthetic evaluation and postoperative follow-up were performed on all patients under the same clinical guidelines by the same surgeon. The following documents were reviewed: outpatient clinical notes, discharge summary, operation notes and laboratory results. All patients were discharged on Day 5 postoperatively and were followed up for 3 months to assess results and generate a comparison. Data were collected and entered simultaneously in the statistical package for social sciences (SPSS software) version 23 and coded appropriately. Descriptive statistics were calculated to summarize the sample characteristics in terms of frequency and percentage. Analytical and inferential analysis was applied between a dependent variable and other independent variables. Significance was set at standard 0.05.

Group A intervention: Limberg Flap Reconstruction Surgery: Methylene blue was injected into the external opening of the sinus and thoroughly massaged to achieve uniform diffusion of the color. The skin was marked for a rhomboid-shaped excision and the entire sinus tract was removed deep down to the presacral fascia. Incorporating gluteal fascia, a right- or left-sided Limberg transplantation flap was fully mobilized on its inferior border and delivered medially to cover the rhomboid defect (excised area) (Fig. 1). A negative suction drain (size 16) was kept in the wound cavity and fixed to the skin with a silk suture in all the cases. Polyglactin and nylon interrupted sutures were used to approximate subcutaneous tissue and skin, respectively, without tension . The drain was removed on the seventh day. Skin sutures were removed after a delayed period of 3 weeks postoperatively in all the patients. One of the patient, post operatively wound margins got necrosed, regular debridement was done and wound healed by secondary intention.(fig. 2)

Group B Intervention: Wide-Open Excision with Healing by Secondary Intention: Following the injection of methylene blue into the sinus tract, wide excision of an elliptical wedge of skin and subcutaneous tissue was made and developed down to the presacral fascia to remove all inflammatory tissue, as well as the sinus tract and debris, allowing the wound to granulate from the base. The wound cavity was not closed but rather left open to heal by secondary intention. In primary closure, wound cavity was closed with polyglactin and nylon for subcutaneous tissue and skin respectively. The patients in this group were advised and explained about the need for daily dressing of the wound at home post-discharge. The time taken for wound healing was measured from the time of incision to the time of wound closure (Group A) or epithelization (Group B). Pressure dressings, a reduced residue diet till postoperative Day 3 and dressing examination on postoperative Days 3 and 7 were all part of the postoperative treatment. Discharge instructions included avoiding extended sitting, riding bicycles or scooters until 6 weeks postoperatively to prevent wound disruption, increasing local cleanliness and shaving or using depilatory cream daily. In this study, most of the study participants were in the age group of 18-27 years in both groups. Male preponderance (76%) was observed in the study with the mean age of study participants of 28 years. The mean age in the Limberg flap group was 28±7 years and that in the wide excision group was 28±6 years. There was not much difference in the mean age of both the groups as participants were randomly distributed in each group. Comparison

of visual analog scale (VAS) scores for pain among study participants of both the groups showed that on postoperative Days 1, 3 and 7 mean VAS score was higher for Group A as compared to Group B, depicting more pain among the study participants who underwent Limberg flap reconstruction surgery. Although, during follow-up visits at 1,2,3 and 4 months study participants in Group A did not complain of any pain. At 1 and 2 months follow-ups, the mean VAS score observed by study participants in Group B was 3±0 and 1±0, respectively (Table 1).

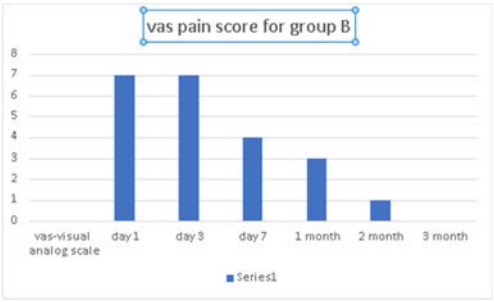
Comparison of VAS Scores for Postoperative Pain Among Different Groups:

VAS-Visual Analogue Scale: In the present study, mean healing time in Group A was 20±2 days and in Group B was 57±11 days and this difference in mean was statistically significant. Also, days of work loss were significantly less in Group A, i.e., 22±2 days as compared to Group B, i.e., 31±5 days (Table 2). Comparison of mean of days of work loss and time taken for wound healing across different groups One of the study participants who underwent limberg flap reconstruction had wound infection (5%). However, 20% of the study participants who underwent wide-open excision surgery with healing by secondary intention (Group B) had wound infection. None of the study participants in our study had recurrence of the disease.

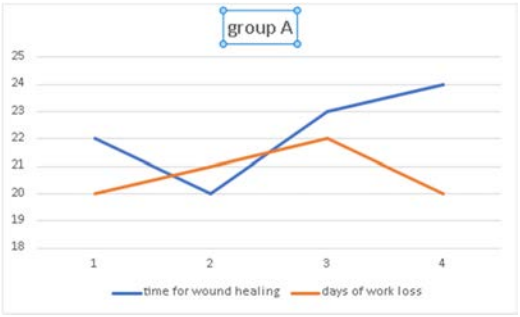
RESULTS AND DISCUSSIONS

An ideal surgery, in addition to clearing the disease, should also remove the natal cleft, removing the anatomical inclination for the sinus to recur. However, none of the strategies has been proven to be superior to others in every way.Sacrococcygeal PNS is most frequent after puberty in males, typically in the second and third decades of life[6]. In accordance with the literature, in the present study, a majority of the participants were in the age group of 18-27 years with a male preponderance. Many of them gave a history of long sitting duration at their respective jobs and had an increased hair growth in the sacrococcygeal region. Similar results were reported by Singh[6], where a majority of patients were in the age group of 20-30 years and most of the patients were males[6]. Sondenaa[2] obtained similar results when they evaluated 322 individuals with pilonidal disease prospectively and calculated that the incidence is 10 times higher in men than in women[2]. On Days 1, 3 and 7, the mean VAS score for pain in Group A was greater than in Group B, indicating that the study participants who received Limberg flap reconstruction surgery experienced more pain postoperatively. This can be explained by the presence of nonabsorbable nylon sutures and drain fixation over the skin causing more pain. The pain, however, significantly reduced after the removal of drain and sutures, hence the majority of the

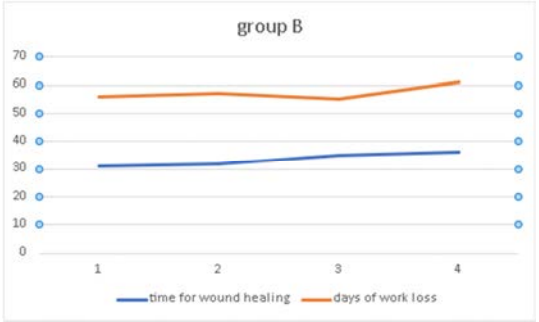
Graph 1:Vas Pain Score for Group A



Graph 2:Vas Pain Score for Group B



Graph 3: Time for Wounding Healing Group A



Graph 4:Time for Wounding Healing Group B

Fig. 1: Limberg Flap Reconstruction Surgery

Fig. 2: Wide-Open Excision with Healing by Secondary Intention

Table 1: Limber Flap Reconstruction Surgery

VAS score	Group A mean±SD	Group B Mean±SD
Day 1	7±1	8±1
Day 3	7±1	7±1
Day 7	5±1	4±1
1 month	0	3±0
2 months	0	1±0
3 months	0	0

Table 2: Healing Time

	Group A mean±SD	Group B mean±SD	t	p-value
Days of work loss	22±2	31±5	7.606	0.000
Time for wound healing(days)	20±2	57±11	16.401	0.000

participants in Group A reported a VAS score of zero during follow-up visits at 1, 2, 3 and 4 months. In a study done by Alam[7] the authors reported that 66.7% and 33% of the study participants respectively reported pain in Group A (Limberg procedure) and Group B (wide excision)[7]. In the present study, 5% cases of wound infection among study participants who had Limberg flap reconstruction surgery (Group A). However, despite regular antiseptic daily dressing, wound infection occurred in 20% of the study participants who received wide-open excision surgery. Jabbar[8] reported in their study that 20% of patients in open procedure and 16.67% of patients in Limberg flap procedure developed wound infections[8]. Similarly, Alam[7] also reported 33% infection in wide excision and only 13% in Limberg procedure[7]. Singh[6] reported five patients in the Limberg flap group and six patients in the broad excision group who suffered wound infections, thereby lengthening their hospitalization stay[7]. In the current study, the mean healing time in Group A was 20±2 days and 57±11 days in Group B, and this difference was statistically significant. Days of work lost were also significantly smaller in Group A (22±2 days) than in Group B (31±5 days). The patients who received Limberg flap repair could return to their work after suture removal, however, patients with wide local excision resisted resuming their work due to significant anxiety about the wound and the requirement of daily dressing. In the study done by Kumar[6] the mean healing time for group II (rhomboid excision with Limberg flap reconstruction) was 17.0±8.0 days and for group III (open excision and healing by secondary intention) was 60±9.6 days which is in accordance with our findings[8]. In the present study, no recurrence was reported in either group. Similar results were reported by Kumar[6] where none of the study participants of either group reported recurrence[8]. On contrary, Singh[6] reported 16% recurrence in the wide excision group[6] Alam[7] also reported 33% recurrence in the wide excision group and only one case of recurrence in the Limberg procedure[7]. A few limitations can be explained in context with the present study. The small sample size is an obvious limitation. The majority of patients were from the Chitradurga region and adjacent areas; as a result of which the sample does not reflect the full Indian population. Also, the study solely compares only three methods of sacrococcygeal PNS surgery; other operations were not included. The topic of cost-effectiveness is also not addressed in this study and will have to be reviewed individually.

CONCLUSIONS

The Limberg flap method outperforms the wide excision approach in terms of wound healing duration, work loss days, postoperative anxiety and the possibility of wound infection. These findings are most likely due to the advantage of the Limberg flap procedure which removes not only the primary sinus but also flattens the natal cleft thereby lowering the possibilities of hair build-up, mechanical discomfort and recurrence. However, the Limberg flap approach may cause significant pain during the early postoperative period as per the findings of this study. To conclude, despite requiring difficult surgical skills, rhomboid excision with Limberg flap is a preferred treatment for PNS illness due to its low recurrence rates and few complications. Other benefits include speedy recovery, a short hospital stay and an early return to daily life.

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