ABSTRACT Aim: Pilonidal sinus disease is an acquired chronic inflammatory condition which is caused due to involution of hair fragment into the gluteal or natal region. This study was aimed to describe the rhomboid excision with Limberg flap reconstruction as surgical treatment of pilonidal sinus disease to redefine the results of this technique.

Methods: The prospective observational study was conducted in the Department of General Surgery, SKIMS Medical College, Srinagar. Total of 82 patients was studied over a period of 4 years. The patients with a clinical diagnosis of the pilonidal sinus in sacrococcygeal natal cleft and admitted for surgical treatment were included in this study. All the patients were subjected to rhomboid excision and Limberg flap reconstruction. The patients were followed in the outpatient department for a period of 2 years. Results: In our study of 82 patients, 60 (73.17%) patients were males, and 22 (26.8%) were females. Most common age group was 15 to 30 years. 68.2% patients of our study presented with discharging sinus as the initial presentation. Average operative time was 30 - 50 minutes. The drain was removed on the second or third post-operative day. Most of our patients were discharged on the third postoperative day. The recurrence was seen only in one of our patients. Conclusion: Limberg flap reconstruction after Rhomboid Excision is a very effective procedure for pilonidal sinus disease. The procedure is easy to perform and is associated with a shorter hospital stay, permits the early return to complete activity, fewer complication rates and faster healing.

KEYWORDS Pilonidal sinus disease, Rhomboid Excision, Limberg flap
sion, which helps difficulties of free healing without relapse if all sinus is completely removed. On the other hand, the wound could be closed by primary intention, applying different technical options [10,11,12].

**Materials and Methods**

Prospective observational study was conducted in the Department of General and Minimal Access Surgery, SKIMS Medical College, Srinagar. All the patients with a clinical diagnosis of the pilonidal sinus in sacrococcygeal natal cleft and admitted for surgical treatment were included in this study.

Total of 82 patients was studied over a period of 4 years (March 2015 to March 2019). All the patients were subjected to history and physical examination. Haematological investigation and pre-anaesthetic check-up were done before admission. Informed written consent was taken from all the patients before the procedure. Institutional ethical committee consent was obtained. After preoperative preparation, the patients were operated under general or spinal anaesthesia.

Patients who presented with acute suppurative pilonidal sinus were initially treated by incision and drainage and broad-spectrum antibiotics, later on, followed by definitive surgical management.

In our study data like gender, age, operational time, postoperative length of hospital stay, postoperative complications (wound infection, seroma, hematoma, etc.), and time needed to retain to work and recurrence were evaluated.

**Operative Techniques:** The patients were operated in prone jackknife position with buttocks pulled apart using an adhesive tape to widen the natal cleft before designing and harvesting of the flap. After proper asepsis, markings were done for both excision area as well as the flap. Methylene blue was routinely injected into the sinus to facilitate total excision of the involved tissue. A rhomboid incision was then made down to the presacral fascia to excise the pilonidal sinus tract as delineated by
Methylene blue. After that, the flap was raised by extending the incision laterally and was transposed to the excised area and closed in two layers. A separate stab incision was used to place a suction drain. Postoperatively the drain was removed after 48–72 hours while as the sutures were removed on 12th – 15th postoperative day. Postoperative antibiotics were given for seven days initially intravenously, then orally. The patients were advised to avoid long term sitting and exercise for two weeks and local hair removal for a period of 6-8 weeks. All the patients were seen on 3rd and 10th day following surgery. Afterwards, they have followed in the outpatient department weekly intervals until complete healing took place and six months after that up to 2 years for any recurrence. (Figure 1,2,3)

Results

The study included a total of 82 patients. 60 patients (73.17%) were males, and 22(26.8%) were females with an overall male to female ratio of 2.7:1. Age of patients ranged between 15-60 years. Most of our patients were between 15 to 30 years of age (Table 1). Most of our patients (n=56) presented with discharging sinus as the initial presentation. Only four patients presented with acute suppurative pilonidal sinus disease (Table 2).

| Age Group (yrs) | Male | Female |
|-----------------|------|--------|
| 15-30           | 35   | 13     |
| 31-45           | 15   | 6      |
| 46-60           | 10   | 3      |
| Total           | 60   | 22     |

Table 1 Age and Sex Distribution

| Symptoms         | No of patients | Percentage |
|------------------|----------------|------------|
| Discharge        | 56             | 68.3%      |
| Chronic Pain     | 18             | 21.9%      |
| Chronic Infection| 4              | 4.8%       |
| Abscess          | 4              | 4.8%       |

Table 2 Initial Presentation

In our study of 82 patients, the average operative time was 30–50 minutes. The drain was removed on a second or third postoperative day when the drain output was less than 20ml/24hrs. Two of our patients had prolonged drainage and drain was removed on the 5th postoperative day. Most of our patients were discharged on the third postoperative day. (Table 3) The sutures were removed on completion of the second week. Six patients in our study developed postoperative complications. Local skin infection occurred in two of our patients, seroma formation in two and margin flap necrosis in one. All the patients were managed conservatively by daily dressing and broad-spectrum antibiotics.

The total healing time was 12 to 15 days. In patients with early postoperative complications, the healing time was further extended by a week. The recurrence was seen only in one of our patients, which developed one and a half year postoperatively (Table 4). None of our patients develop haematoma or complete wound separation. In our study, patients returned to their normal routine activity in 14 – 22 days while as a time to walk without pain postoperatively ranged from 12 – 16 days. (Table 5)

Table 3 Operative and Post-operative data.

| Operative Time | 30–50 Minutes |
|----------------|---------------|
| Hospital Stay  | 48–72 Hours   |
| Drain Removal  | 2-3 day       |
| Suture Removal (Wound Healing) | 2 weeks |

Table 4 Post-operative Complications.

| Complication | No of patients | Percentage |
|--------------|----------------|------------|
| Infection    | 2              | 2.43%      |
| Seroma       | 2              | 2.43%      |
| Necrosis     | 1              | 1.21%      |
| Recurrence   | 1              | 1.21%      |

Table 5 Clinical Results.

| Time needed to return normal activity | 14 – 21 Days |
| Time to walk without pain            | 12 – 16 Days |

Discussion

Pilonidal sinus disease is an annoying chronic benign disease causing disability and agony in the young adult working population. Pilonidal sinus disease forms a symptom complex with presentation ranging from asymptomatic pits to the painful, draining lesion. The disease is most commonly seen in the sacrococcygeal region but has also been reported in umbilical region[13], an interdigital region of hands [14] and the axillary region[15].

There is a myriad of techniques available for the management of this disease. All the techniques have their laws and advantages. They include incision and drainage, cryosurgery, excision with open packing, excision with primary closure, flap surgeries (Karydakis flap, Bascom flap, V-Y flap, Limberg flap, modified Limberg flap, Dufourmentel flap, Z-plasty, and gluteus maximus fasciocutaneous flap), etc. [16,17]. The ideal technique should be simple, easy to perform, low cost, less post-operative pain and wound care and associated with low recurrence rate with minimum excision. Conservative management is rarely advocated nowadays, and most of the patients are offered surgical treatment [18].

The Limberg flap is a random flap that can be raised from any corner of the rhomboid and can be used to close the defect. This flap is used in covering the defects after pilonidal sinus excision. The defect should be filled with the tissue of the same thickness [19]. Limberg flap has many advantages as it is easy
to perform and design, and it flattens the natal cleft with large vascularized pedicle, sutured without tension. This study was aimed to describe the rhomboid excision with Limberg flap reconstruction as surgical treatment of pilonidal sinus disease to redefine the results of this technique. A total of 82 patients were operated in our study. There were 60 males, and 22 females and the most common age group affected was 15–30 years. These results are comparable to a study done by Karydakis AM [20].

A maximum number of our patients (68.3%) presented with discharging sinus as initial presentation followed by chronic pain (21.9%), infection (4.8%) and abscess (4.8%). Six patients in our study developed postoperative complications. Local skin infection occurred in two of our patients, seroma formation in two and margin flap necrosis in one. The recurrence was seen only in one of our patients, which developed one and a half year post-operatively. None of our patients developed haematoma or complete wound separation. The study done by Katsouli et al. showed that 16 of their patients developed complications with no recurrences [21]. Aslam had 110 patients, with 5 of them having complications and one recurrence [16]. Aithal SK operated upon 30 patients of pilonidal sinus and found that 3 of their patients had flap oedema, 2 had flap necrosis, and no recurrences [22].

In our study, our patients had a hospital stay of 2–3 days. The results are comparable with studies done by Urhan et al. [23] and Aslam et al. [16].

In our study, patients returned to their normal routine activity in 14–21 days while as a time to walk without pain postoperatively ranged from 12–16 days. The study was done by Abu Galala et al. [24] found that the rhomboid flap group returned to work a mean of nine days earlier than the deep suturing group (23 days).

Conclusion

Pilonidal sinus is a chronic inflammatory disease causing agony to the patients. Limberg flap reconstruction after Rhomboid Excision is a very effective procedure for pilonidal sinus disease. The procedure is easy to perform and is associated with a shorter hospital stay, permits an early return to complete activity, fewer complication rates and faster healing. The procedure does not require prolonged postoperative attention and has a very low recurrence rate and postoperative morbidity.

Competing Interests

None

Funding

None

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