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Muzi's Tension Free Primary Closure of Pilonidal Sinus Disease: Updates on Long-Term Results on 514 Patients

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Abstract

Background The aim of this study is to evaluate the long-term results of Muzi's tension free primary closure technique for pilonidal sinus disease (PSD), in terms of patients' discomfort and recurrence rate.

Methods This study is a retrospective analysis of prospectively collected data. Five hundred fourteen patients were treated. Postoperative pain (assessed by a visual analog scale, VAS), complications, time needed to return to full-day activities, and recurrence rate were recorded. At 12, 22, and 54 months postoperative, patients' satisfaction was evaluated by a questionnaire scoring from 0 (not satisfied) to 12 (greatly satisfied).

Results The median operative time was 30 min. The overall postoperative complication rate was 2.52%. Median VAS score was 1. The mean of resumption to normal activity was 8.1 days. At median follow-up of 49 months, recurrence rate was 0.4% (two patients). At 12 months' follow-up, the mean satisfaction score was 10.3 ± 1.7. At 22 and 54 months' follow-up, the score was confirmed.

Conclusions Muzi's tension free primary closure technique has proved to be an effective treatment, showing in the long-term follow-up low recurrence rate and high degree of patient satisfaction. Therefore, we strongly recommend this technique for the treatment of PSD.

Keywords Pilonidal sinus disease (PSD) · Tension free primary closure · Surgical technique · Long-term results · Recurrence

Introduction

Pilonidal sinus disease (PSD) is an acquired chronic condition, due to the obstruction of the hair follicles in the natal cleft.[1,2] Subsequently, the hair penetrates in the skin, inducing infection that may result in the creation of an abscess and a cyst and may form a fistula.[3] It is estimated that PSD has an incidence of about of 26 cases out of 100,000 in young adults, and that affects preferably young male population, with a man to women ratio of about 4 to 1.[1–4] The most common risk factors in the development of PSD are male gender, age between 18 and 30 years, obesity, poor hygiene, recurrent trauma to the sacrococcygeal region, and long sitting time.[2,3,5] In most cases, PSD is a minor condition but may induce important discomfort, pain, and immobility, causing time lost from school or work.[3,6]

The choice of treatment for PSD should be a simple surgery, in local anesthesia, and should result with few postoperative complications and little pain, timely resumption of patients' activity, no need of hospital stay, good esthetic results, and most of all should be a definitive treatment with low recurrence rate.[1,7] Several surgical treatments are reported in literature to treat PSD, including techniques such as Limberg's transposition flap, Karydaki's flap reconstruction, complete surgical excision of the cyst, the endoscopic pilonidal sinus

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treatment (EPSiT), and the use of the vacuum therapy,[1,6,8–10] but until now, the best choice technique is still debated and a gold standard treatment has not yet been achieved.[11,12]

The aim of the present study is to evaluate the long-term results of Muzi's tension free primary closure technique for PSD, in terms of patients' discomfort and recurrence rate.

Materials and Methods

This study is a retrospective analysis of prospectively collected data. Institutional review board (IRB) approval and informed consent from all participants included in the study were obtained.

Between January 2004 and December 2016, all patients presenting with PSD underwent Muzi's tension free primary closure technique[7] and were included in the present study. Surgery was performed by experienced consultant from the same department. Complications were graded according to the Clavien classification.[13]

All patients were discharged with the indications as follows: metronidazole (500 mg twice a day for 5 days) and oral analgesic (10 mg ketorolac), if necessary. Shaving of the natal cleft, twice monthly for 2 years, was strongly recommended to all patients, in order to prevent early recurrence of the PSD.

Postoperative pain, postoperative complications, elapsed time needed to return to work (return to full-day activities), and recurrence rate were recorded. Postoperative pain was assessed according to a visual analog scale (VAS) from 0 (no pain) to 10 (worst pain imaginable) on the third postoperative day.

At 12, 22, and 54 months after surgery, patients' satisfaction was evaluated by a questionnaire including a score ranging from 0 (not satisfied) to 12 (greatly satisfied). The questionnaire, at 12 months, focused on presenting symptoms, medical treatments sought, time to resumption of normal activity, antibiotic treatment undertaken, and previous surgical interventions and at 22 and 54 months, focused on the esthetic results, overall patient satisfaction, and recurrence rate. In addition, items such as patients "completely satisfied", "completely happy to have been operated (on)", and patients who were determined to "absolutely recommend the operative technique to others" were recorded.

Surgical Technique

Since the presence of acute infection is a negative prognostic factor of surgical success,[26] patients presenting with pilonidal sinus abscess were first incised and drained and, once the acute infection healed, were treated like the remaining patients.

Surgery for PSD has been previously described.[7] It is briefly illustrated below.

Surgery was performed under local anesthesia. Metronidazole 500 mg was administered to all patients in the operating room.

Patient was placed in the prone position with the hips slightly flexed. To expose the natal cleft, the buttocks were widened with adhesive tape. Povidone iodine solution was employed to disinfect the sacral area. The skin and the deep tissues around the sinus were infiltrated with ropivacaine (7.5 mg/mL, 20 mL) and mepivacaine hydrochloride (2 mg/mL, 20 mL).

Sinus openings were filled with methylene blue. An elliptical skin excision was performed, with its long axis oriented, to remove all sinus openings. The dissection continued up the presacral fascia, without opening it. A double layer of interrupted Polysorb 2.0 resorbable sutures was employed to close the residual cavity. The suture of the deeper layer included the deeper half of the subcutaneous tissue and the presacral fascia. The suture of the superficial layer included the external half of the subcutaneous tissue together with the dermis, but not the epidermis. Superficial and deep sutures are alternated to produce less tension on the tissues.[7,14,15] Identification of the layers is simplified by keeping superficial and deep sutures on opposite sides of the cavity. In order to avoid drainage, resorbable gentamicin collagen fleece (Gentafleece, Baxter Healthcare Corporation, Deerfield, IL, USA) was used to fill the residual cavity in the first 450 patients; in the last 64 cases, antibacterial absorbable hemostat (Tabotamp, Ethicon Inc., Somerville, NJ, USA) and gentamicin cream were used since the first product was no longer available. To approximate the two edges without tension on the skin layer and to avoid its ischemia, skin closure was performed using interrupted resorbable sutures (Caprosyn 3.0) or, in selected cases, cyanoacrylate synthetic glue (Dermabond, Ethicon Inc., Somerville, NJ, USA).

Results

Between January 2004 and December 2016, 514 consecutive patients (409 males, 105 females) with PSD underwent Muzi's tension free primary closure technique. The mean age was 25 years (range 16–55 years) for male patients and 24.4 years (range 16–57 years) for female patients.

Patients' clinical presentations on admission were as follows: 211 (41%) chronic infection with multiple fistulas in large areas, 113 (22%) acute pilonidal sinus abscess, 89 (17.3%) recurrent PSD, 62 (12.1%) complaining of little pain and pruritus, and 39 (7.6%) asymptomatic seeking medical consultation for familiarity or discharge from natal cleft (Table 1).

It was not possible to calculate the median time between incision and drainage and definitive treatment for patients presenting with acute pilonidal sinus due to high variability in hospital waiting times.

Table 1 Patients' clinical presentations

Chronic infection with multiple fistulas, *n* (%)	211 (41)
Abscess, *n* (%)	113 (22)
Recurrent pilonidal sinus disease, *n* (%)	89 (17.3)
Little pain and pruritus, *n* (%)	62 (12.1)
Asymptomatic, *n* (%)	39 (7.6)

The median operative time was 30 min (range 15–45 min). Complete wound healing was observed in 511 patients (98.4%). Dehiscence was observed in two patients (0.4%), on postoperative day 5. These patients were treated conservatively and experienced healing in about 8 weeks (grade II). Wound infection was observed in ten patients (1.9%) with a chronic active abscess (six) and chronic infection (four), requiring minor debridement of the infected wound (grade III). The overall postoperative complication rate was 2.52%. All patients were mobilized between 2 and 4 h after surgery. The median postoperative hospital stay was 8 h (range 7–10 h). Severe postoperative pain was not observed. At first postoperative day, the median pain VAS score was 1 (range 0 to 3). The mean time (days) to resumption to normal activity (school or work) was 8.1 days (range 2–20 days).

At median follow-up of 49 months (range 4–156 months), recurrences were observed in two patients (0.4%), treated with incision and drainage placement to promote second intention healing (Table 2).

Questionnaires were administered to all patients, and 445 (87%) were returned. At 12 months' follow-up, the mean satisfaction score was 10.3 ± 1.7. At 22 and 54 months' follow-up, the score was confirmed. After follow-up, 97% of the assessed patients were "completely satisfied", "completely happy to have been operated", and determined to "absolutely recommend the operative technique to others."

Discussion

Muzi's tension free primary closure technique was proposed for the first time in 2009 for the treatment of PSD.[16] Even thought the present study has the limitation of being of retrospective nature, this technique seems to be a valid surgical treatment option in case of PSD, both at short-term follow-up, resulting in low postoperative complication rate (2.52%) and high patients' satisfaction, and at long-term follow-up (median 49 months), resulting with low recurrence rate (0.4%), approaching much to the ideal intervention described by Sahsamanis et al..[1]

In literature, several surgical techniques are reported for the treatment of PSD.[17] The open wound technique was described for the first time by Lord and Millar.[18] During this procedure, the skin around the primary pit was excised without closing the wound.[18–21] Kement et al. described a series of patients, who underwent surgery in local anesthesia, reporting at medium term follow-up a recurrence rate of 1.6%, a 54.8% of patients "completely satisfied with the procedure", and a 79% of patients that "absolutely recommend the technique to other patients" at questionnaire.[19]

Marsupialization was proposed with the aim to reduce the wound size.[18] Solla et al. presented a series with 150 patients and at 4 years' follow-up reported a recurrence rate of 6%.[20] Oncel et al. reported a randomized control trial (RCT), comparing a group of 20 patients who underwent PSD excision alone with a group of 20 patients who underwent marsupialization.[21] At the 10-month follow-up, statistically significant differences, in favor of excision alone, were observed in operative time, hospital stay, and in work off period. Recurrence rate was 10% in the marsupialization group and 0% in the group who underwent excision alone, but this data was not statistically significant.[21]

Table 2 Patients' characteristics and results

Male patients, *n*	409
Mean age, years (range)	25 (16–55)
Female patients, *n*	105
Mean age, years (range)	24.4 (16–57)
Median operative time, minutes (range)	30 (15–45)
Complete wound healing, *n* (%)	511 (98.4)
Complications, *n* (%, Clavien's classification, grade)	
Dehiscence	3 (0.6, II)
Wound infection	10 (1.9, III)
Median postoperative hospital stay, hours (range)	8 (7–10)
Median VAS score, *n* (range)	1 (0–3)
Median days needed to resumption to normal activity, (range)	8.1 (2–20)
Median follow-up, months (range)	49 (4–156)
Recurrences, *n* (%)	2 (0.4)

VAS visual analog scale

The excision and primary closure technique, for the treatment of PSD, is also a well-known procedure.[17] Primary wound closure showed several advantages, if compared to excision alone, such as to avoid prolonged wound care, an earlier healing period and return to work, less patients' discomfort, and hospital stay.[17,22,23] Al-Salamah et al. reported an RCT in which patients who underwent excision and primary closure (188 patients) and patients who underwent excision alone (192 patients) were compared.[22] No statistically significant difference regarding infection rate between the two groups was reported, while the healing period and the work off time were significantly shorter in the primary closure group.[22] At median follow-up of 36.3 months and 35.2 months, in the primary closure group and in the open group, respectively, no statistically significant differences in recurrence rate were observed (3.7 and 3%, respectively).[22] This data is confirmed by another RCT that compared two groups of 37 and 40 patients who underwent excision alone or excision with primary closure, respectively, reporting that primary closure was significantly better in terms of postoperative complications, wound healing period, and time of work off.[23]

Also, several flap reconstructions, such as the rhomboid one, the V-Y advancement, the Z-plasty, and the gluteus maximus myocutaneous flap, are reported in literature.[17] These procedures have the advantages of preventing wound tension and reducing postoperative pain but nevertheless results in a wider scar.[7,24,25] Akca et al. reported an RCT in which 100 patients underwent excision and conventional primary closure, and 100 patients underwent the Limberg flap procedure. In this study, the flap procedure seemed to be superior in terms of postoperative pain, complications and mobilization, hospital stay, and work off time, and, at median follow-up of 28 months, a recurrence rate of 2% was reported (versus 11% in the excision and primary closure group).[25] In 2010, Muzi et al. published an RCT comparing the Limberg flap procedure versus the modified primary closure proposed by the author. In this study on 260 patients, the Limberg flap procedure resulted in a shorter time confined to bed and less wound infections while Muzi's technique showed a shorter surgical time and less postoperative pain; no significant differences were found in recurrence rate, time off from work, and wound dehiscence.[26]

Conclusions

Analyzing the results of the present study in terms of complete wound healing, postoperative complication rate, hospital stay, VAS score, resumption of normal activity, and recurrence rate, Muzi's tension free primary closure technique seems to have better results if compared with data reported in literature regarding other techniques and it seems to be an effective treatment, for both long-term follow-up (median 49 months) and high degree of patient satisfaction.

Properly designed RCTs are required to establish the gold standard treatment of PSD, but based on the present data, we strongly recommend this technique.

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Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: Marco Gallinella Muzi, Pietro Mascagni, Oreste Bonomo, Agnese Cianfarani, Claudia Mosconi, Marco Colella, Andrea Balla, Silvia Quaresima, Giuseppe Petrella, Pierpaolo Sileri.

Compliance with Ethical Standards

Conflict of Interest Marco Gallinella Muzi, Pietro Mascagni, Oreste Bonomo, Agnese Cianfarani, Claudia Mosconi, Marco Colella, Andrea Balla, Silvia Quaresima, Giuseppe Petrella, and Pierpaolo Sileri have no conflicts of interest or financial ties to disclose.

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