https://doi.org/10.29309/TPMJ/2024.31.02.7951

The Professional Medical Journal
www.theprofesional.com
2024, Volume, 31 Issue, 02

ORIGINAL ARTICLE

Karydakis operation for pilonidal sinus disease in overweight and obese patients. A study of the efficacy of the procedure in 136 patients.

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Article Citation: Azeem M, Cheema K, Iqbal M, Bashir T, Iqbal Z, Khan Z. Results of Karydakis operation for pilonidal sinus disease in overweight and obese patients. A study of the efficacy of the procedure in 136 patients. Professional Med J 2024; 31(02):307-314. https://doi.org/10.29309/TPMJ/2024.31.02.7951

ABSTRACT… Objective: To test the efficacy of the Karydakis procedure in overweight and obese patients and to check the recurrence rates in our patients. **Study Design:** Multicenter Prospective study. **Setting:** Sughra Shafi Medical Complex Narowal. **Period:** May 2011 to July 2021. **Material & Methods:** Total 146 patients were selected for this study a formal informed consent was taken. Ten patients were lost from follow up and excluded from study. **Results:** Out of remaining 136 patient 130 were male and only 6 were female. Mean age of the patient was 23 year and 5 months (range 16 years to 49 years). Thirty five patients had a single sinus in the midline, Seventy two had multiple sinuses in the midline, and 38 patients had lateral tract either on the right or on the left side in addition midline sinuses. Mean operating time was 39 minutes (range 23 – 70 minutes), mean blood loss was 26 ml (10 – 70ml) and mean hospital stay was 3 days (range 2- 7 days). There were a total of 21 (15 .05 %) complications. Seven(4.29) patients developed major wound infection requiring opening of the sutures and regular dressing till the wound became healthy to be closed by secondary suturing. Seven patients developed minor wound infection, 6 patients developed seroma and 3 patients had leakage of serous fluid from drain site for a couple of days. There were only 5 (3.67%) recurrences in mean follow up period of 23 months (range 11 months to 4 years). Two (1.47%) recurrence were observed in patient with BMI of below 35 and 3 recurrences (2.20%) were observed in patient with BMI of >35. All of them occurred in obese patient who could not maintain their personal hygiene according to advice given to them. Majority of the patient were satisfied with the procedure. **Conclusion:** We concluded that Karydakis operation has good outcome in overweight and obese patients. It addresses the etiological factors of the disease, is less time consuming as compared to other flap operation, is not associated with wound scar in the midline, can be easily performed by surgeons in training, is associated with minimum complications, has minimum recurrence rate on short and long term follow up, avoid the painful prolong dressing regimen and well accepted by the patients.

Key words: Karydakis Flap, Limberg Flap, Rhomboid Excision.

INTRODUCTION

Pilonidal sinus is notorious for its ability to recur and presents significant challenge to an interested surgeon. Many surgical and non-surgical methods of treatment have been described but there is no single procedure acceptable to all surgeons. Many surgeons worldwide are practicing different surgical methods and each one has its own concepts and statistics. There is no consensus about any surgical procedure for the pilonidal sinus disease. Laying the wound open and putting the patients on painful, time consuming dressing regimen is still widely practiced at least in our country. Unsatisfactory wound healing with repeated bleeding and soakage of under garments, prolonged period of dressing, inconvenience for the patient to attend the dressing clinic, work loss and day off, high rate of recurrence in spite of maximum effort on the part of patient and the treating physician and some social restrictions have been remained the main concern of the patients.

Presence of natal cleft in the inter-gluteal groove, hot and humid condition leading to excessive sweating, desquamated cells from the back,

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Article received on: 28/10/2023
Accepted for publication: 31/12/2023

prolonged sitting, prolonged driving, lack of personal hygiene, hairy back and high body mass index have been considered the etiology of the pilonidal sinus. All these factors contribute to maceration which ultimately leads to infection. Acute abscess may form in the natal cleft which discharges in the due course of time leading to sinus formation. Repeated episodes of infection lead to the formation of a chronic pilonidal sinus.

Morbid obesity is considered one of the cause of chronic pilonidal sinus along with other factors. As the natal cleft is more deep in obese patient and it remains deeper even after treatment of pilonidal sinus disease by various surgical procedure used for the treatment of pilonidal sinus disease. Obesity is also considered contributory factors in the recurrence of the pilonidal sinus disease.

There is lot of controversies about the best suitable surgical treatment of pilonidal sinus disease. An ideal operation should be simple, should be associated with less hospital stay, low incidence of recurrence, minimum wound care, minimum pain and decrease time off work.[1] Since the description of acquired theory of pilonidal sinus disease by Karydakis[2], the treatment of pilonidal sinus disease has been revolutionized. Karydakis himself described an asymmetrical elliptical excision of all the tract and lateralization of the midline with excellent result.[3] Karydakis operation eliminates the etiological factors which are responsible for recurrence after various other surgical procedures. Karydakis operation results in lateral surgical scar marks away from natal cleft and makes the natal cleft shallow. The hair fall after this procedure is smooth. The shallow natal cleft reduces maceration which ultimately translates into lower recurrence rate.

There are very few studies in the literature addressing the effects of increasing body mass index on the outcome and complications after Karydakis operation. We designed this study in overweight and obese patient with pilonidal sinus disease who underwent Karydakis operation to see the effects of obesity on recurrence and other complications.

Karydakis procedure eliminates the etiological factors of the disease which are responsible for the disease and recurrence after its surgical treatment. This procedure has been successfully used by Bascom with some modification.[4] Worldwide various treatment options like conservative treatment for small and non-infected sinus, simple elliptical excision and laying the wound open, midline closure after elliptical excision[5], pilonidal sinotomy[6], Z plasty[7] Limburg's flap[8], Bascom technique with its various modification[9] and Karydakis[10] procedure are in vogue. There is no single uniformly acceptable treatment option for these nasty holes at least in this part of the world. The options are many, but the correct choice is difficult for a new surgeon. I selected Karydakis operation for my patients except pilonidal abscess and presented my experience.

OBJECTIVES

1. To test the efficacy of the procedure in overweight and obese patients.
2. To check the recurrence rate associated with Karydakis operation in overweight and obese patients.

MATERIAL & METHODS

This is a multicenter prospective study done in University of Lahore Teaching Hospital, Ever care Hospital Lahore and Jinnah Hospital Lahore after approval from local ethical committee. Between May 2011 to July 2021, 159 overweight and obese patients presented to surgical outpatient department with pilonidal sinus disease and 18 patients presented to surgical emergency with pilonidal sinus abscess. The patients with pilonidal abscess were treated with incision and drainage and were excluded from the study. Out of 159 patients, 6 patients were not considered for surgical treatment because of their less severe disease and advised conservative treatment. These patients were treated by pilonidal sinotomy in outpatient department under local anesthesia due to their mild nature of disease and dressing. The remaining 146 patients underwent Karydakis operation. The patient's age, profession, their chief complaints, duration of symptoms, previous surgical treatment, number of pilonidal holes and presence or absence of lateral tract and body

mass index (BMI) was noted. The procedure was explained to the patients and written consent was taken. 10 patients were lost from the follow up and were excluded from the study.

Procedure

All patients were operated in prone jack knife position with buttock strapped apart. Methylene blue was injected in all patients to delineate the tracts. An asymmetrical elliptical incision was made around the tracts. The incision 'a' was started about 1.5 – 2 cm away from midline on one side curving just around the sinus in the midline to end 1.5 -2 cm away from midline on the same side Figure-1. The other side of the elliptical incision 'b' was on the normal skin of the buttock. This side covered the lateral tract whether it was on the right side or on left side. The length of the incision was 4-7 cm depending on the disease. The ellipse containing sinuses, their branches and granulation tissue was taken out down to presacral fascia. The flap opposite to incision 'b' was raised on the fascia covering the gluteus Maximus muscle for 3-5 cm to make the approximation of the edges of the incision without tension. The deeper part of the fatty layer of the flap was sutured to its opposite counterpart with vicryl 2/0 and 3/0. A suction drain No 14 was placed in the cavity thus created by undermining of the flap. Absolute hemostasis was achieved using electrocautery. The skin was closed with 3-0 fine interrupted suture achieving the best possible approximation. All patients received three doses prophylaxis of either amoxicillin with clavulanic acid (Augmentin) or second generation cephalosporin.

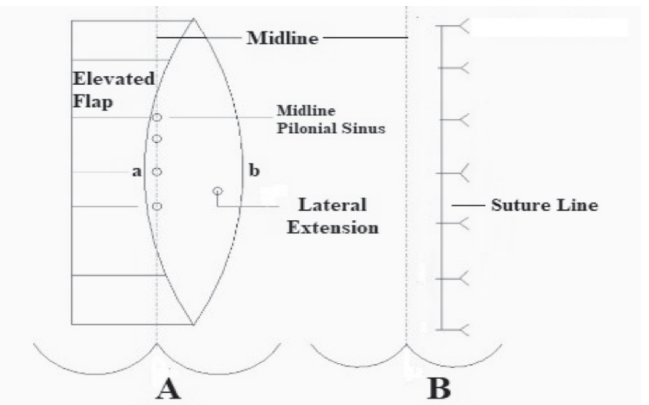

Fig.1.Schematic diagram of Karydakis operation.

All patients were observed for wound infection and other complications during hospital stay. The drain was removed when it was less than 15 ml in last 24 hours to avoid formation. All patients received injectable pethidine or diclofenac sodium after surgery. This was converted to oral co-proxamol after 12 to 36 hours. All patients tolerated the procedure well. A proforma was attached to the file of each patient stating all the particular of the patient. All patients were questioned about the acceptability of the procedure at the time of discharge from the hospital and on the first follows up visit. All patient were advised to have bath at least on alternate day and dry the natal cleft with clean towel starting from two weeks after surgery. Suture were removed on the 9th (mean) post-operative day. (Range 7- 12 post-operative day). The patients were followed up in the outpatient department for complications and recurrence. The mean follow up periods was 2 years and 3 months (Range 1 - 4 Years).

RESULTS

Out of remaining 136 patients 130 were males and only 6 were female patients. The mean age of the patients was 23 years and 5 months (range 16 years to 49 years). 35 patients has single pilonidal sinuses in the midline, 72 had multiple pilonidal sinuses in the midline and 38 patients multiple sinuses in the midline with lateral tracts either on the right side or on the left side. Out of 136 patients, 47 patients had recurrent disease. Most of them had either excision or laying opening of the wound or symmetrical elliptical excision and midline primary closure. Out of 136 study patients, 122 were hairy. The mean BMI of the patients was 32.4 (range 30.1 -38.7).

The mean age of the patients was 23 years (1- 4 years). The mean operative time was 39 minutes (range 32 minutes to 70 minutes). Mean blood loss was 16 ml (range 10 ml to 70 ml). The mean hospital stay was 3 days (range 2 to 7 days). There were a total of 21 (15.44 %) Complications. Major wound infection was observed in only 7 (4.29%) patients who required removal of sutures and laying the wound open.

Figure-2a.
A typical PNS

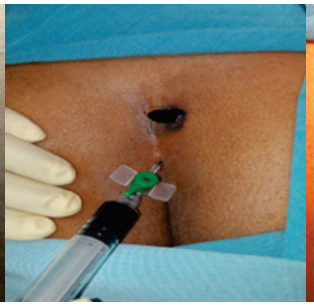

Figure-2b.
Methylene blue injection

Figure-2c.
Marking of Incision

Figure-2d.
Incision

Figure-2e.
Excision in process

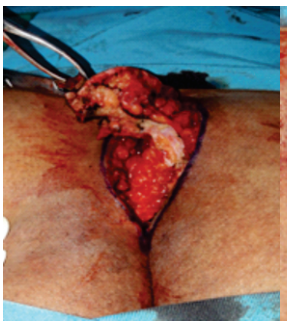

Figure-2f.
Excision of PNS

Figure-2g.
After excision

Figure-2h.
Raising fasciocutaneous flap

Figure-2i.
Final closure

Figure-2, (a- i). Important steps of Karydakis Operation.

Mean age of the patients:	23 years(1-4 years)
Mean operating time:	39 minutes (32-70 Minutes)
Mean blood loss:	16 ml (10- 70 ml)
Total complications:	21 (15.44%)
Major wound infections:	7 (4.29%)
Minor wound infection:	7 (6.61%)
Seroma formation:	6(4.41%)
Leakage serous fluid from drain site:	3 (2.20%)
Total recurrences observed:	5 (3.67%)
Recurrence in patient with BMI* of <35	2 (1.47 %)
Recurrence in patient with BMI* of >35:	3 (220 %)
Persistent pain over wound site: (Oral analgesia for 4 weeks)	5(3.67%)
Paresthesia in the wound:	6(4.41%)

Table-I.

Out of these 4 patients had secondary closure of wound under local anesthesia without the need for prolonged dressing. The healing was satisfactory after secondary closure. The remaining three opted for regular dressing in the outpatient department till there wound healed completely. The 9(6.61%) patients developed minor wound infection which required removal of one or two sutures followed by satisfactory healing. It did not prolong the hospital stay. Out of these complication, 6(4.41%) patients developed seroma formation which required aspiration or drainage.

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Paresthesia in the wound:	6(4.41%)
(* BMI was defined as weight of the patient divided by height in meter square)	

Table-II. Results of patients.

The patients were followed up for a mean period of mean 23 months (1 – 4 years). There were only 5 (3.67%) recurrence observed during this period. All of the recurrences were in patients with poor personal hygiene who did not follow the advice. Four patients had oozing of serous fluid from drain site which persisted for up to 3 days after removal of drain but it was without any serious consequences. There was no recurrence observed at exit point of suction drain. The procedure was well tolerated by the patients. Only 12 patients required inject able pain killer up to second post-operative day.

In most of the patients, drain was removed on 2nd to 4th post-operative day. The obese patients had more serosanginous discharge from the suction drain and maximum hospital stay up to 8 day was observed in these patients. The mean duration of drain removal was 3rd post-operative day.123 patients were discharged after removal of drain. 13 patients had removal of drain in outpatient departments.131 patient were satisfied.

The procedure while 5 patients complaint of persistent pain at the time of discharge requiring oral analgesia for two weeks. 6 patients complaint of paresthesia in the wound but adopted well after a period of 3- 4 months. All patients were satisfied with the procedure after one month.

DISCUSSION

The pilonidal sinus disease has always been a problematic for the interested surgeon. This is an acquired disease mostly seen in young person's.[2] The disease is more common in hairy persons with deep natal cleft. The natal cleft is favorite site for hair insertion and the sweaty environment of the natal cleft promotes it. Maceration and bacterial contamination leads to infection and sinus formation. The disease is a source of constant nuisance for the patients because of repeated abscess formation and persistent discharge of pus and blood stained fluid. It is frequently associated with staining of under garments and pain affecting daily activities. It is associated with significant postoperative morbidity and dissatisfaction on the part of the patient due to high incidence of recurrence.[9,11,12]

Overweight and morbid obesity is considered one of the risk factors of pilonidal sinus disease. The natal cleft in the obese patient is further deep as compared to lean and thin patients. There is more friction in obese patient due to heavy buttocks. This contributes to maceration along with sweating and desquamated cells which collects in the natal cleft.

Complete excision of the pilonidal sinuses had been widely practiced all over the world but what to do after excision remain controversial.[12,13] The persistence of natal cleft after complete excision, excision and marsupialization, excision and primary closure in the midline prompted surgeons to discover new techniques to eliminate the gluteal furrow from the midline.[3,6-8,14] Various plastic surgical techniques such as Z-plasty[7], V-Y plasty[15], W-plasty, rhomboid flap of Limburg[8] and Karydakis[3] procedure had been used to eliminate the natal cleft from the midline. These procedures are reported to be associated with relatively low recurrence rates but all are associated with a wound scar crossing the midline except Karydakis flap. Presence of central wound scar is potential source of recurrence.[14,15] Karydakis operation has been reported to have low recurrence rates in our previous study. This operation has been reported to eliminate the various risk factors.

Karydakis advancement flap is asymmetrical excision of the pilonidal sinuses and advancement of the flap to achieve suture line away from the midline. This lateralization of the wound flattened the natal cleft and avoids hair insertion in the midline. The largest series (6545 patient) had been reported by Karydakis[3,16] with a recurrence rate of less than 1 % at two year follow up. He described that the operation addresses the primary cause i.e. the presence of deep natal cleft and the insertion of loose shredded hair into the wet environment of the natal cleft. The operation is simple and easy to perform and associated with minimum morbidly and minimum recurrence rates.[4,10,11-21] The operation has good results in obese and overweight patients because it makes the natal cleft shallow and suture line is away from the midline.

The recurrence of the pilonidal sinus had been reported from 3 – 43 % for various surgical techniques in the literature.[10,11] It is most common with excision and leaving the wound open. Another painful thing is the long dressing regimen, which results in a high time off work and costs lot of hospital resources without significant benefit. Symmetrical excision and closure of the wound in the midline is also associated with high recurrence rate due to vulnerable weak scar in the midline.[22] Three main causes of recurrence as described by Karydakis are 1) the invader hair 2) force which causes hair insertion e. intermittent negative pressure in the deep natal cleft during activities like driving and 3) vulnerability of the of the skin because of sweating.[2,3,16] Symmetrical elliptical excision does not addresses the three main causes of recurrence. Thus for the treatment and prevention of recurrence, causative factors must be eliminated. Karydakis operation addresses the first two causes. The third cause is only eliminated by good personal hygiene and change in the life style.

Since the description of the procedure by Karydakis in 1968 many series has confirmed lowest recurrence rates associated with Karydakis operation as compared to other surgical procedures.[17,18] The recurrence rate in this series was 1.23% which is well comparable to recent published studies.[17-23] The recurrence was observed in obese patient (BMI of greater than 35) who could not maintain their personal hygiene according to advice. We believed that the maintenance of personal hygiene is important to address the third etiological factor of the pilonidal sinus disease. This can be achieved by advising the patient to have a bath at least on the alternate day and dry the area of natal cleft with clean towel to avoid maceration.

There are very few studies in the literature reporting the outcome of Karydakis operation in overweight and morbidly obese patients. These patients are difficult group to manage due to deep natal cleft, exaggerated sweating, presence of friction induced dermatitis in the natal cleft, in ability to take care of hygiene of the natal cleft area and complications after any surgical procedure for pilonidal sinus disease. Our main focus in this study was to see the outcome in these patients after Karydakis operation. Although the rates of complication is slightly more in the present study as compared to non-obese patient but it was not significantly high. Another problem which was noted in the series was break down of suture line at the lower edge of the incision due to increased tension in the incision. Most of the wound infection started from the lower end of incision due to breakdown of sutures. This area was difficult to manage to it close proximity to anal area.5 out of 7 wound infection started in the lower end of the wound in the presence series. We presumed that contamination from the anal area contributed to wound infection in the obese patients. The patient education to take care of personal hygiene is very important. Further we advised our patient not sit flat on the chair to avoid stretch on the suture line. They were advised to sit on the chair either on right side or left side to avoid this stress on suture line. The patients who follow the advice had less postoperative wound complications.

The recurrence has been described at the needle hole of the sutures, for which some authors used subcuticular sutures to avoid such recurrence.[24] In this series no recurrence at the suture was observed. Probably this was because of use of 3-0 prolene instead of 0 prolene use by some others. The recurrence also depends on the length of the follow up but majority occur within three years. Karydakis flap has shown les recurrence even after prolong follow up as compared to other techniques. The mean follow up time in this study was 23 month (11 month - 4 years). A prolonged follow up is required to estimate the long term recurrence.

The use of drain is another controversial issue.[24,25] Because of the undermining of the flap considerable dead space is produced which merits drainage Increased seroma formation and wound breakdown has been described without drain or drain other than the suction drain.[24] In this series the suction drain was used in all patients. The use of suction drain has been reported to be associated with less wound complications rate in recent studies. Sakr and Ahmet Gurer et

al[26,27] strongly recommended the use of suction drain in asymmetrical flap of Karydakis. It is also recommended after Limburg flap and excision with primary closure in the midline. Seroma formation and wound break down was observed only in those patients in whom the drain was removed earlier or removed accidentally. This was observed in the early cases. Later the drain was only removed when drainage was less than 15 ml in 24 hours. Although this prolonged the hospital stay for a couple of days in few patients but its benefits out weighed in term of reducing the complications rate which was 12 % over all in this study. Oozing of serous fluid from the drain site was observed in four obese patients there but it ultimately stopped without any untoward complications within 1 – 2 days. Routine cavity drainage is recommended in recent studies and we also advocated use of suction drain.[26,28]

In this series we excluded the infected pilonidal sinus from the study cases because of fear of the increase risk of wound complications. However Peterson et al[28] reported good results in infected cases although the wound complication rate was higher 21 % vs. 2 % in Karydakis group and open group respectively. They concluded that Karydakis operation can be performed in infected cases and it can avoid the need of second procedure at the cost of some increased wound complications. Encouraged by these result we have plan to perform this simple technique in infected patients as well.

CONCLUSION

We concluded that Karydakis operation has acceptable outcome in morbidly obese patients. Its most logical approach in pilonidal sinus disease as it addresses the etiological factors of the disease, is less time consuming as compared to other flap operation, is not associated with wound scar in the midline, can be easily performed by surgeons in training, is associated with minimum complications, has minimum recurrence rate on short and long term follow up, avoid the painful prolong dressing regimen and well accepted by the patients. The rate of complications in overweight and obese patient is slightly high as compared to patient with normal body weight due to their built.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Muhammad Azeem	Acquisition, Analysis or interpretation of data.	
2	Kamran Cheema	Critical review of the manuscript for important intellectual content.	
3	Muhammad Iqbal	Concept of the manuscirpt.	
4	Tahir Bashir	Design of manuscript.	
5	Zafar Iqbal	Drafting of the manuscript.	
6	Zafar Khan	Statistics analysis.	