Section: General Surgery

Original Research Article

EXCISION WITHOUT CLOSURE VERSUS LIMBERG FLAP TECHNIQUE IN PILONIDAL SINUS OF GLUTEAL CLEFT

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ABSTRACT

Background: Pilonidal sinus disease is a common condition affecting the sacrococcygeal region, predominantly in young adults. Various surgical techniques have been described for its management. Wide local excision with healing by secondary intention remains a conventional approach, while Limberg flap reconstruction offers an alternative aimed at reducing wound-healing time and recurrence. This study compares the clinical outcomes of these two surgical techniques.

Materials and Methods: A retrospective comparative study was conducted involving 60 patients who underwent surgical treatment for pilonidal sinus between June 2024 and May 2026. Patients were divided into two groups: Group I (n=30), who underwent wide local excision with healing by secondary intention, and Group II (n=30), who underwent excision with Limberg flap reconstruction. The outcomes assessed included postoperative pain using the Visual Analogue Scale (VAS), duration of hospital stay, time to return to work, wound-healing time, postoperative complications, recurrence and patient satisfaction.

Results: The mean hospital stay was significantly shorter in the Limberg flap group compared with the conventional excision group (2.30 ± 0.47 versus 2.77 ± 0.43 days; $p<0.001$). Mean wound-healing time was significantly reduced following Limberg flap reconstruction (18 ± 5 versus 31 ± 13 days; $p=0.001$). Wound infection occurred in 13.3% of patients in the Limberg group compared with 23.3% in the conventional group. Recurrence was observed in 6.6% and 30% of patients, respectively. Patient satisfaction was higher following Limberg flap reconstruction (83.3% versus 50%). Postoperative pain scores were comparable at one week. The mean time to return to work was 10.5 ± 7 days in the Limberg group and 11.4 ± 4 days in the conventional group.

Conclusion: Limberg flap reconstruction offers favourable outcomes compared with wide local excision and healing by secondary intention in the surgical management of pilonidal sinus disease, particularly with regard to faster wound healing, shorter hospital stay, lower observed recurrence and greater patient satisfaction. Although technically more demanding, Limberg flap reconstruction represents an effective surgical option.

Keywords: Pilonidal sinus; Limberg flap; Wide local excision; Secondary intention healing; Wound healing; Recurrence; Sacrococcygeal disease.

INTRODUCTION

Pilonidal sinus is one of the most common infectious conditions around the sacrococcygeal region with idiopathic aetiology. It can be both congenital and acquired. This is common in western and east Asian countries. Clinical features vary from a simple cyst like lesion to an abscess. Most of the disease lies in the superficial plane in the intergluteal cleft.[1-9]

The incidence rate is 26 in 1000 population predominant in young males. The likeliness of the incidence can be attributed hair density, obesity, occupation and trauma.[1,8]

The hair which penetrates under the skin acts as the nidus for infection thereby leading to chronic recurrent infection and occasional discharge. This infection along with features of inflammation impair the quality of life.[2,9]

Many of the patients come for treatment in the later stages of the disease due to social reluctance. Due to this treating pilonidal sinus becomes challenging and varies based on the stage of the disease as later stages are difficult to treat.[3,6]

There are many treatment options for Pilonidal sinus.in this study we are comparing conventional method i.e excision followed by healing by secondary intention and Limberg's flap closure for treatment of Pilonidal sinus.[3,6]

MATERIALS AND METHODS

A total of 60 patients have undergone surgery for pilonidal sinus between June 2024 and May 2026 and were included in this study. This study was initiated after approval from the local ethical committee. All the patients who underwent conventional surgery were made into Group 1 and all the patient who underwent Limberg's Flap procedure are group 2. The medical records of all the patients were evaluated retrospectively. The surgical methods were compared with respect to time of surgery, pain scoring period post operatively, return to work, total time of healing, patient satisfaction, number of emergency OPD visits and Recurrence.

All the patients who lost for follow up, who underwent hybrid procedures and not consented were excluded from this study.

Patients pain score is calculated using Visual analog scale (VAS), patient satisfaction score is calculated using three grades from 1 to 3.

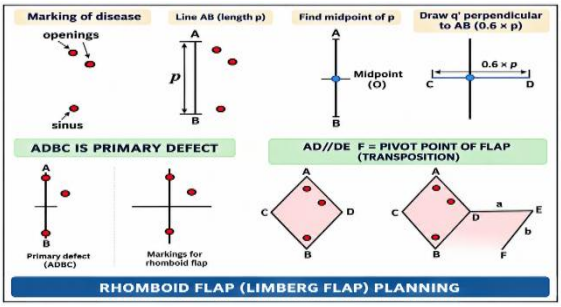
Ethical Approval and Informed Consent: The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC), NRI Medical College, General & Superspeciality Hospital, Chinakakani, Guntur, prior to the commencement of the study (IEC Registration No: ECR/1160/Inst/AP/2018/RR-22 and Protocol No: IEC 2026 F019; Date: 04/11/2026). Formal approval for this study was granted by IEC after comprehensive review of the statistical analysis.

Limberg Flap Technique

The excision and flap site was mapped. The ratio of length to width was 60%.

A rhomboid shape incision was made and continued to the post sacral fascia. The skin was marked by a marker pen after methylene dye injection. The involve area is excised by a rhomboid excision as shown in Figure.

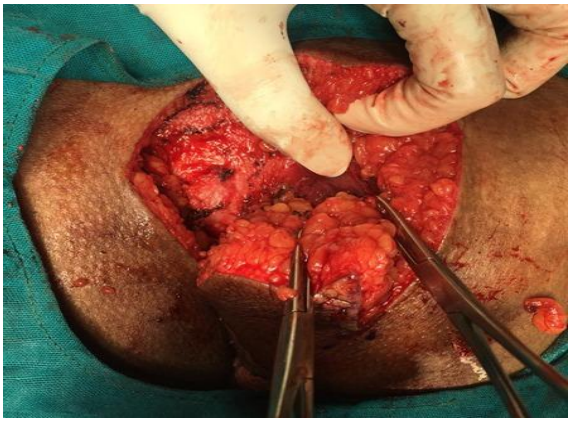
The flap is raised at pre muscular plane and this flap is transposed to excised area. The subcutaneous tissue and skin is sutured separately without tension using polyglactin (Vicryl) and ethilon interrupted suture after Romovaccum drain placement.

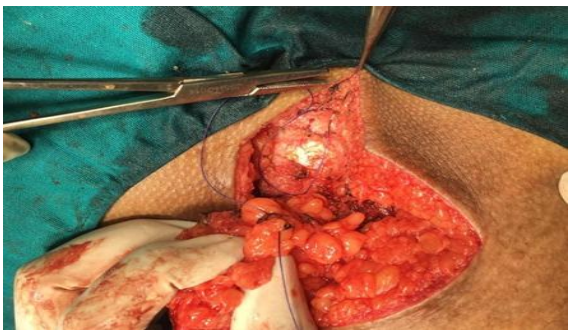


Excision Without Closure: The excision site was marked 1 cm away from the sinus. Then an elliptical incision was made that extended to the post sacral fascia. The tissue was resected, and haemostasis was achieved by applying electrocautery. The wound was then left for healing by secondary intention.







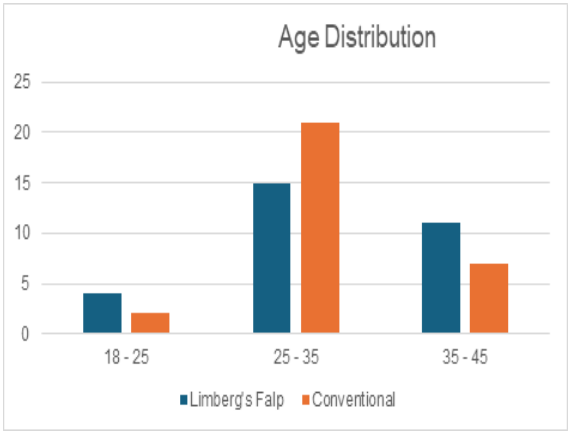


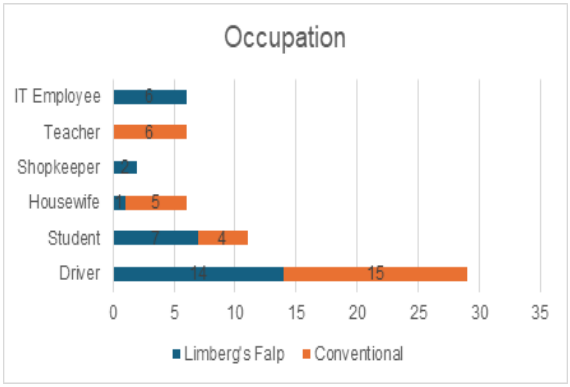


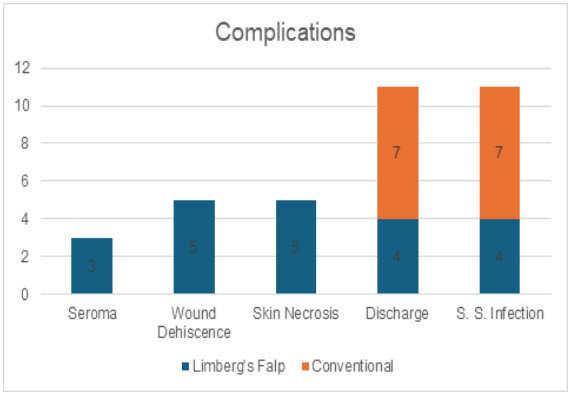




RESULTS







Some of the complications are overlapping the other or concurrent with each other.

Table 1: Age distribution

Age (in years)	Limberg's Falp	Conventional
18 - 25	4	2
25 - 35	15	21
35 - 45	11	7
Mean	29.43	27.27

Table 2: OCCUPATION

Occupation	Limberg's Falp	Conventional
Driver	14	15
Student	7	4
Housewife	1	5
Shopkeeper	2	0
Teacher	0	6
IT Employee	6	0
Total	30	30

Table 3: Complications

Complications	Limberg's Falp	Conventional
Seroma	3	0
Wound Dehiscence	5	0
Skin Necrosis	5	0
Discharge	4	7
S. S. Infection	4	7

Table 4: Length of Hospital Stay

Hospital Stay	Limbergs Flap	Conventional	P Value
2 days	21	7	
3 days	9	23	
Mean	2.3	2.77	<0.001
Time to Work	10.5+/-7days	11.4+/- 4 days	0.06
Time of Healing	18+/-5days	31+/-13days	0.001
Patient satisfaction			
Satisfied	25	15	
Not Satisfied	5	15	0.006
Post Op Pain (avg VAS)			
POD1	6.43	6.63	0.87
POD2	4.36	4.7	0.79
PO 1 week	3.1	3	1

Combined Comparison of Wide Local Excision vs. Limberg Flap

Study	Surgical Technique	Sample Size (N)	Operative Time (min)	Hospital Stay (days)	Complete Wound Healing Time (days)	Return to Work / Function (days)	Postoperative Pain Profile	Wound Infection Rate	Seroma / Collection Rate	Recurrence Rate	Cosmesis, Scar & Patient Satisfaction
This Study	Wide Local Excision	30	25-40 mins	2.77±0.43	31± 13 days	11.4± 4 days	AVG VAS 3 after 1 week	23%	0%	30%	Patient satisfaction 50%
This Study	Limberg Flap	30	45-60 mins	2.30±0.47	18± 5 days	10.5 ± 7 days	AVG VAS 3.1 after 1 week	13.3%	10%	6.6%	Patient satisfaction 83.3%
Palsania et al. (2023)	Wide Local Excision	25	Not specified	112.96 ± 1.332	49.56 ± 7.803	52.68 ± 8.004	45.64 ± 7.59 days	28%	40%	16%	High open-wound dressing pain; satisfactory long-term outcomes
Palsania et al. (2023)	Limberg Flap	25	Significantly longer	6.84 ± 1.522	16.68 ± 5.043	19.64 ± 5.144	14.80 ± 5.72 days	8%	4%	4%	High open-wound dressing pain; satisfactory long-term outcomes
Ali et al. (2025)	Wide Local Excision	35	33 (range: 30–35)	1–27	Healing by secondary intention	21–28 (3–4 weeks)	Pain-free walking: 15–17 days	5.7% (2/35)	0%	8.6% (3/35)	Lower satisfaction; higher pain score (VAS 6–8)
Ali et al.	Limberg Flap	35	40 (range: 35–45)	1–27	Accelerated	12–15 (2–3 weeks)	Pain-free walking:	0% (0/35)	2.8% (1/35)	0% (0/35)	Lower pain score

(2025)					primary closure		12–15 days				(VAS 2–4); higher overall satisfaction
Chopade et al. (2022)	Wide Local Excision	25	Not specified	Discharged Day 3	57 ± 11	31 ± 5	VAS 3 at 1 mo, 1 at 2 mo; high anxiety	20% (5/25)	30%	0% (0/25)	Persistent open-wound stress
Chopade et al. (2022)	Limberg Flap	25	Not specified	Discharged Day 3	10 ± 2	22 ± 2	Higher early pain (Day 1–7); VAS 0 at 1–4 mo	0% (0/25)	0%	0% (0/25)	Minimal anxiety after suture removal
Singh et al. (2025)	Wide Local Excision	31	47.74 ± 6.03	10.39 ± 1.98	34.71 ± 14.48	39.97 ± 16.04	VAS: Day 1 6.32; Day 5 4.94; Day 14 3.35	19.4% (6/31)	0%	0%	Satisfaction VAS: 4.97 (1 mo) to 8.16 (6 mo)
Singh et al. (2025)	Limberg Flap	32	66.72 ± 6.67	6.13 ± 1.01	13.47 ± 1.72	14.38 ± 2.19	VAS: Day 1 4.56; Day 5 2.94; Day 14 1.75	3.1% (1/32)	6.2% (2/32)	0%	Satisfaction on VAS: 7.81 (1 mo) to 9.94 (6 mo)
Punyo et al. (2026)	Wide Local Excision	15	33.33 ± 10.80	Shorter stay	Longest median healing	23.00 ± 5.61	Minimal early drain pain	10% (SSI)	0%	13.3% (2/15)	Scar scale: 7.07 ± 1.75; QoL Physical: 65.10
Punyo et al. (2026)	Limberg Flap	16	135.75 ± 16.67	Longer stay	Shorter healing	32.50 ± 18.71	Closed drain required (6.69 days)	12.4% (SSI)	43.8%	0% (0/16)	Scar scale: 5.44 ± 1.50; QoL Physical: 72.67

DISCUSSION

In the present study, both procedures were associated with a short hospital stay, although the mean duration was slightly shorter following Limberg flap reconstruction than after wide local excision (2.30 ± 0.47 versus 2.77 ± 0.43 days). The operative time was, as expected, longer for Limberg flap reconstruction, with a duration of 45–60 minutes compared with 25–40 minutes for wide local excision. This difference reflects the additional steps involved in flap mobilization, transposition, and closure. A similar pattern was observed in the study by Singh et al., in which the Limberg flap required a longer operative time than wide local excision (66.72 ± 6.67 versus 47.74 ± 6.03 minutes), while the duration of hospital stay was shorter with the flap procedure (6.13 ± 1.01 versus 10.39 ± 1.98 days). Thus, although flap reconstruction may require greater operative effort, this additional operative time may be accompanied by advantages during the subsequent recovery period.[5]

A major finding of the present study was the shorter wound-healing period following Limberg flap reconstruction. Complete wound healing occurred at a mean of 18 ± 5 days following Limberg flap surgery compared with 31 ± 13 days after wide local excision. This difference is clinically relevant because prolonged open-wound care following excision can impose a considerable burden on patients and may delay resumption of normal activities. The findings are consistent with the comparative studies included in the present analysis. Palsania et al. reported substantially shorter healing times following Limberg flap reconstruction than following wide local excision, with reported values of 16.68 ± 5.04 and 49.56 ± 7.80 days, respectively3. Similarly, Chopade et al. reported a healing time of approximately 10 ± 2 days following Limberg flap reconstruction compared with 57 ± 11 days following wide local excision. Ali et al. likewise reported accelerated primary healing following Limberg flap reconstruction, with pain-free walking achieved within 12–15 days compared with 15–17 days following wide local excision.[4]

The shorter healing period observed with the Limberg flap can be understood in relation to the fundamental difference in wound management between the two techniques. Wide local excision may leave a relatively large defect that requires healing by secondary intention, necessitating prolonged dressing and wound care. In contrast, the Limberg

flap permits immediate coverage of the defect with vascularized tissue and results in primary closure. This approach can reduce the period during which the wound remains open and may facilitate earlier progression toward complete healing. The observations from the present study therefore support the potential role of flap reconstruction when rapid wound healing is an important treatment objective.

Postoperative pain showed relatively comparable values in the present study. The mean visual analogue scale (VAS) score at one week was 3 in the wide local excision group and 3.1 in the Limberg flap group. This suggests that the greater extent of surgical manipulation associated with flap reconstruction did not translate into a clinically substantial difference in pain at one week in the present cohort. This finding differs somewhat from the observations reported by Ali et al., where patients undergoing wide local excision had higher postoperative pain scores (VAS 6–8), whereas patients undergoing Limberg flap reconstruction reported lower scores (VAS 2–4). Singh et al. similarly documented higher pain scores following wide local excision, with VAS scores of 6.32 on day 1, 4.94 on day 5, and 3.35 on day 14, compared with 4.56, 2.94, and 1.75, respectively, following Limberg flap reconstruction.6 These differences may reflect variation in postoperative analgesic protocols, timing of pain assessment, wound-management strategies, and individual patient characteristics. Consequently, pain outcomes should be interpreted within the methodological context of each study rather than in isolation.

The present study also demonstrated a lower wound infection rate following Limberg flap reconstruction, with infection occurring in 13.3% of patients compared with 23% following wide local excision. The difference is consistent with several comparative studies. Palsania et al. reported infection rates of 28% following wide local excision and 8% following Limberg flap reconstruction,[3] while Chopade et al. reported infection rates of 20% and 0%, respectively. Singh et al. observed a particularly marked difference, with infection occurring in 19.4% of patients undergoing wide local excision compared with 3.1% following Limberg flap reconstruction.[4] These findings suggest that primary flap closure may provide a more favourable wound environment than prolonged management of an open excisional wound. Nevertheless, the relatively small sample sizes across these studies mean that differences in infection rates should be interpreted cautiously.

Seroma or postoperative collection was observed in 10% of patients following Limberg flap reconstruction in the present study, whereas no collection was recorded after wide local excision. This finding is important because it demonstrates that flap reconstruction is not uniformly associated with fewer postoperative complications. The comparative literature also demonstrates variability. Ali et al. reported a collection rate of 2.8% following Limberg flap reconstruction compared with no collection after wide local excision, while Singh et al. reported collections in 6.2% of patients undergoing Limberg flap reconstruction and none following wide local excision. Conversely, Palsania et al. reported collection rates of 4% and 40% following Limberg flap reconstruction and wide local excision, respectively. Thus, the occurrence of seroma appears to vary between series and may be influenced by factors such as dead-space management, drain use, operative technique, and postoperative wound care.[3]

Recurrence represents one of the most important long-term outcomes following treatment of pilonidal sinus disease. In the present study, recurrence was observed in 30% of patients following wide local excision compared with 6.6% following Limberg flap reconstruction. This represents an important difference between the two procedures in the current cohort. The lower recurrence rate following Limberg flap reconstruction is also reflected in several of the comparative studies. Palsania et al. reported recurrence rates of 16% following wide local excision and 4% following Limberg flap reconstruction,[3] while Chopade et al. reported no recurrence in either group. Ali et al. reported recurrence in 8.6% of patients after wide local excision and no recurrence following Limberg flap reconstruction.4 Singh et al. similarly reported no recurrence in either group during the reported follow-up period. 5These findings indicate that recurrence outcomes can vary considerably among studies, but the markedly lower recurrence observed with the Limberg flap in the present study supports its potential role in reducing disease recurrence.

The lower recurrence rate following Limberg flap reconstruction may be related to the alteration of the local anatomy achieved by the procedure. Transposition of the flap results in flattening and lateralization of the natal cleft, potentially reducing the depth of the cleft and the local conditions that contribute to hair accumulation and recurrent disease. In contrast, wide local excision without reconstructive modification of the cleft may leave the underlying anatomical predisposition unchanged. However, recurrence is multifactorial, and patient-related factors, disease extent, postoperative wound care, duration of follow-up, and surgical technique may all influence reported recurrence rates.

Patient satisfaction and cosmetic outcome were also favourable following Limberg flap reconstruction in the present study. Overall satisfaction was reported in 83.3% of patients following Limberg flap reconstruction compared with 50% following wide local excision. Similar differences were reported by Ali et al., who described higher overall satisfaction following Limberg flap reconstruction, and by Singh et al., who reported substantially higher satisfaction scores at both one and six months following flap reconstruction5. Chopade et al. also described persistent stress associated with an open wound following wide local excision, whereas patients undergoing Limberg flap reconstruction experienced minimal anxiety after suture removal.[4] These observations suggest that patient satisfaction is

influenced not only by recurrence but also by the duration of wound care, speed of healing, ability to return to normal activities, and the perceived appearance of the postoperative scar.

The return-to-work or functional recovery data in the present study showed a relatively small difference between the two procedures, with mean recovery periods of 11.4 ± 4 days following wide local excision and 10.5 ± 7 days following Limberg flap reconstruction. Although the difference was modest, it was directionally favorable toward flap reconstruction. Published studies have demonstrated greater differences in some cohorts. Palsania et al. reported return-to-work periods of 45.64 ± 7.59 days following wide local excision and 14.80 ± 5.72 days following Limberg flap reconstruction3, while Chopade et al. reported corresponding values of 31 ± 5 and 22 ± 2 days.[4] The differences between studies may reflect variation in occupational demands, definitions of functional recovery, wound-healing protocols, and criteria used to determine return to work.

An important consideration when interpreting the available evidence is the heterogeneity between studies. The studies included in the present comparison vary in sample size, outcome definitions, follow-up duration, and reporting methods. For example, operative time, healing time, pain, and functional recovery were not measured or reported uniformly across all studies. Punyo et al. reported a longer operative time with Limberg flap reconstruction and a higher collection rate in the flap group, while reporting no recurrence in either group.[7] Such findings demonstrate that the benefits of a particular surgical technique may not be identical across all clinical settings. Differences in surgeon experience, patient selection, disease severity, wound-management protocols, drain usage, and follow-up duration may contribute to variation in outcomes.

The findings of the present study should therefore be interpreted in the context of its sample size and study design. The relatively small number of patients limits the precision with which differences between treatment groups can be estimated. In addition, recurrence is a time-dependent outcome, and adequate long-term follow-up is essential before definitive conclusions regarding durability can be drawn. Nevertheless, the consistency of several observations across the comparative literature—particularly faster wound healing, lower infection rates, lower recurrence in several series, and greater patient satisfaction following Limberg flap reconstruction—provides supportive evidence for the role of off-midline flap reconstruction in the management of pilonidal sinus disease.

Overall, the present study demonstrates that Limberg flap reconstruction was associated with a longer operative time but a shorter wound-healing period, slightly shorter hospitalization, comparable postoperative pain at one week, lower wound infection, lower recurrence, and greater patient satisfaction than wide local excision. Wide local excision remains a technically straightforward procedure and may be appropriate in selected patients; however, its longer healing period and higher recurrence observed in the present cohort are important considerations. The findings support the use of Limberg flap reconstruction as an effective reconstructive option when the objectives of treatment include rapid wound healing, reduced recurrence, and improved patient-reported satisfaction. Larger prospective studies with standardized outcome measures and longer follow-up are required to further establish the comparative effectiveness of these techniques.

CONCLUSION

In the current research, the Limberg flap reconstruction was found to be more beneficial than the wide local excision for the treatment of pilonidal sinus disease. The flap procedure took significantly longer to perform than excision. On the other hand, it resulted in a shorter healing period, a shorter length of hospitalization, fewer wound infections after discharge, less recurrence, and overall greater satisfaction among the patients. The pain levels at one week were found to be comparable between the two groups.

The shorter overall healing period and the lower rates of disease recurrence following the Limberg flap reconstruction could be explained by the reduced number of contributing factors. The primary closure and epidermis flap result in the faster healing of the surgical site. Moreover, the flap procedure decreases the risk of developing a pilonidal sinus by flattening the cleft. The increased satisfaction of patients who underwent the flap procedure also contributes to their faster return to normal activities.

Thus, based on the current study, the Limber flap reconstruction can be considered a beneficial option for the treatment of patients with pilonidal sinus disease. It was found to result in faster healing, fewer post-surgery complications, fewer recurrences of the disease, and higher patient satisfaction. However, larger trials should be conducted to further validate these findings and examine the benefits of the two procedures in the longer term.

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