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Evaluation of Gluteal Artery Perforator Flaps in Reconstruction of Gluteal Pressure (Decubitus) Ulcers

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ABSTRACT

Background: Pressure ulcer reconstruction remains a great challenge for plastic surgeons because of their high postoperative complication and recurrence rates. Commonly these ulcers are reconstructed with random pattern flaps or myocutaneous flaps. Gluteal artery perforator flaps have evolved in the last few decades and became popular in reconstructing pressure ulcers in the gluteal region because they preserve the gluteal muscle, allowing for revision in cases of recurrence.

Objective: To evaluate the use of gluteal artery perforator flaps in reconstructing pressure ulcers of the gluteal region as regards aesthetic outcome, postoperative complications and patients' psychological satisfaction.

Patients and Methods: Our study was conducted on 15 patients presented with grade IV pressure ulcers in the gluteal region, in which their ulcers were reconstructed with gluteal artery perforator flaps.

Results: Twelve (80%) patients healed eventually without major complications. Two (13.3%) patients had wound edge dehiscence, and only one (6.7%) patient had a donor site wide scar. Patients were evaluated as regards aesthetic outcomes and patients' psychological satisfaction, and the overall results were satisfactory.

Conclusion: The superior and inferior gluteal artery perforator flaps, with their safe anatomical basis, less morbidity and versatility in designs, are reliable and effective alternatives in reconstructing pressure ulcers of the gluteal region.

Key Words: *Gluteal artery perforator flaps – Gluteal pressure ulcers reconstruction.*

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Ethical Considerations: Our study was performed in accordance to Helsinki Declaration, after approval of The Local Ethical Committee of Faculty of Medicine, Beni-Suef University.

Consent: An informed written consent was obtained from all patients before the surgical procedures. It was about surgery, possible outcomes and complications.

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INTRODUCTION

Pressure ulcers occur as a result of unrelieved high-pressure exposure to the skin and/or underlying tissue, usually over a bony prominence. This continuous pressure leads initially to ischemia, and finally to necrosis of the affected area. They are also known as decubitus ulcers or bed sores **[1]**.

High risk individuals for these pressure ulcers include those who are admitted in intensive care unit (ICU), spinal cord injuries, lower extremity fractures and bedridden patients especially the elderly ones **[2]**.

The National Pressure Ulcer Advisory Panel (NPAUP) documented that stage III and IV pressure ulcers have to be surgically treated, while stage I and II ulcers are conservatively managed after applying all preventive measures. However, these ulcers may progress into more serious forms which will eventually need surgical intervention **[3]**.

Pressure ulcers mostly occur in the sacral and ischial regions. The surgical management of these gluteal ulcers represents a challenge to plastic surgeons because of the patients' bad general condition in addition to local and systemic infections, making a difficulty to obtain a successful reconstruction without long term recurrence **[4]**.

The main surgical treatment of pressures ulcers includes adequate wound debridement followed by transfer of soft tissue so as to provide adequate dead space filling and healthy skin coverage. Many flaps are used for the reconstructive procedure. In

perforator flaps, the skin and subcutaneous fat are removed from a distant or adjacent part of the body so as to reconstruct the excised part. Vessels that give blood supply to the flap are isolated perforators derived from a deep source artery and travel through the intermuscular septa or the underlying muscle **[5]**.

In 1993, the use of superior gluteal artery perforator (SGAP) flap for sacral pressure ulcers was reported by Koshima et al., In 2002, the use of inferior gluteal artery perforator (IGAP) flap for ischial defects was reported by Higgins et al., In addition, they reported the superior features of these flaps including muscle sparing, versatility in design and less donor site morbidity **[6]**.

Another advantage is the large number of sizable perforators related to the superior and inferior gluteal arteries, that makes the planning of various sizes and shapes of flaps around the defect area possible **[7]**.

PATIENTS AND METHODS

Our study was a prospective randomized one, which was conducted in the period between September 2020 to May 2022 on fifteen adult patients presented with stage IV pressure ulcers in the gluteal region (sacral or ischial). Patients were collected from the out-patient plastic surgery clinic of Beni-Suef University Hospital, where their ulcers were reconstructed by the superior and inferior gluteal artery perforator flaps.

Patient's evaluation:

A full medical history was taken from all patients along with general and local examination considering the site, size, shape and depth of the defect as well as donor site examination regarding infection or scars. In addition, a pre-operative laboratory (CBC, LFTs, KFTs, Blood sugar and Coagulation. Profile) and radiological (plain X-ray of pelvis in AP view to exclude osteomyelitis) investigations were done . Both color duplex ultrasonography and hand-held Doppler device were used for pre-operative identification of superior and inferior gluteal artery perforators. Photographs were taken pre, intra and postoperatively after having a consent from patients for publishing their photos.

Pre-operative preparations:

Smoker patients were advised to quit smoking for 4-6 weeks preoperatively. Controlled diabetics were followed on insulin scale during their hospital stay. Anemia and hypoalbuminemia were controlled (hemoglobin and albumin levels were at / or above 10 and 3mg/dl, respectively). Infection was controlled by surgical wound debridement and antibiotics.

Wound bed preparation: Surgical debridement was done to all infected gluteal ulcers in the operating room, as a separate preliminary stage before flap reconstruction. It included debridement of all necrotic and infectious tissues along with careful hemostasis (Fig. 1).

Pre-operative flap markings:

After being placed in prone position, the locations of posterior superior iliac spine (PSIS), ischial tuberosity (IT), greater trochanter (GT) and coccyx (C) were identified on the patient. Then, a line was drawn from PSIS to the greater trochanter, and the intersection of the upper and middle third of this line represented the location of the superior gluteal artery. Another line was drawn from PSIS to the ischial tuberosity, and the intersection of the and middle and lower third of this line represented the location of the inferior gluteal artery. The piriformis muscle was located on a line drawn from the midpoint of the line connecting PSIS and the coccyx to the greater trochanter. Perforators of SGA and IGA lie above and below the muscle, respectively.

Perforators were then identified using the 8MHz hand-held ultrasound doppler device (Bistos Hidop BT-200, Korea), in which the ones with the higher sound intensity were marked. In case of a SGAP flap, the skin paddle to be harvested was marked around perforators of the SGA, and in case of an IGAP flap, it was marked around those of the IGA. More than one perforator could be included in the flap (Fig. 2).

The operative procedure:

In our study, all patients were operated upon under general anesthesia in a prone position, and an intravenous antibiotic prophylaxis (3rd generation cephalosporin 1gm) was preoperatively administered. Also, a sterile urinary catheter was inserted so as to monitor urine output. All operative procedures were performed by the same surgical team and it included the following steps:

1- *Excision of the ulcer:* A tumescent solution containing epinephrine for hemostasis was injected. Then, the ulcerated area was excised along with the underlying bursa and any bone spicules were rasped with an osteotome when necessary. The wound was then washed with a saline garamycin solution.

2- *Technique of perforator flap reconstruction:* All procedures were operated under loupe magnification (4x) (Figs. 3-6).

2A- *Flap harvesting:* Incising the superior border of the flap with a 15 scalpel blade was performed, and dissection was continued down at 90º with a monopolar cautery through the subcutaneous fat and the gluteal fascia until reaching the gluteal muscle.

2B- *Flap dissection:* Dissection was done, using a small blunt dissection scissors in a subfascial plane parallel to the gluteal muscle fibers, where the perforators were easily identified by direct visualization in this avascular plane. After that, the best perforator was chosen and marked with a vessel loop around. Skeletonization of perforators was not performed in our study. Then, incising the whole flap was completed all around, and the flap was completely islanded and raised above the gluteal muscle.

2C- *Flap insetting:* Before insetting, the flap was checked for dermal bleeding at its edges. Then, it was carefully lifted from the donor bed and advanced into the recipient site. Care was taken so as to avoid kinking or twisting of the dissected perforator. Closure was done in two layers: Subcutaneous layer by 2-0 vicryl and skin layer by 3-0 prolene sutures. A small rubber drain was inserted under the flaps, far away from the perforator site, in order to avoid its spasm.

2D- *Donor site closure:* All donor sites were closed primarily in our study. We preferred closure of the donor site first so as to reduce the tension between the flap and the defect. A closed suction drain was inserted in order to prevent any donor site collection.

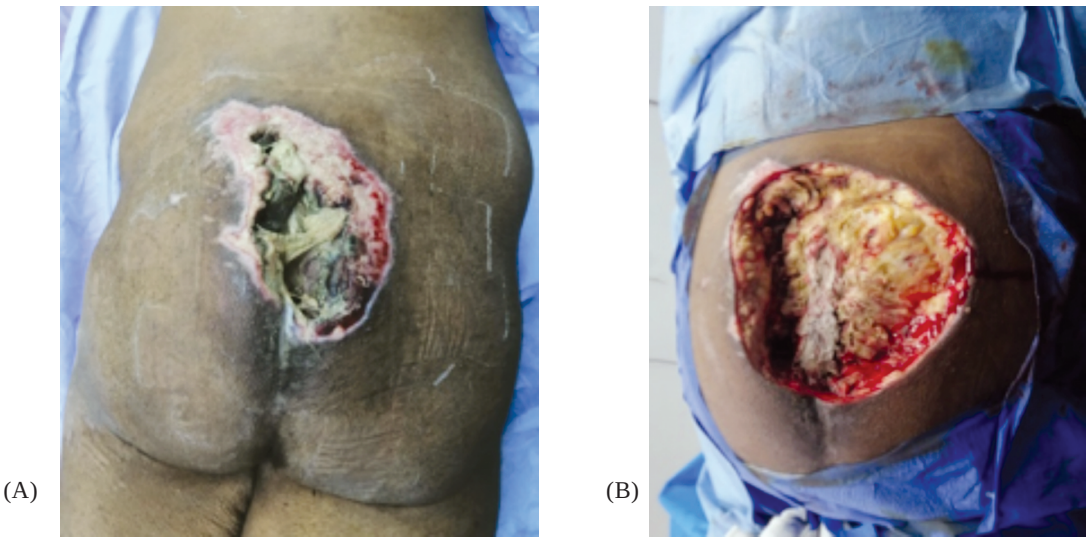

Fig. (1): Debridement of infected sacral pressure ulcer. (A): Intraoperative photos before debridement & (B): Post-operative photos after debridement.

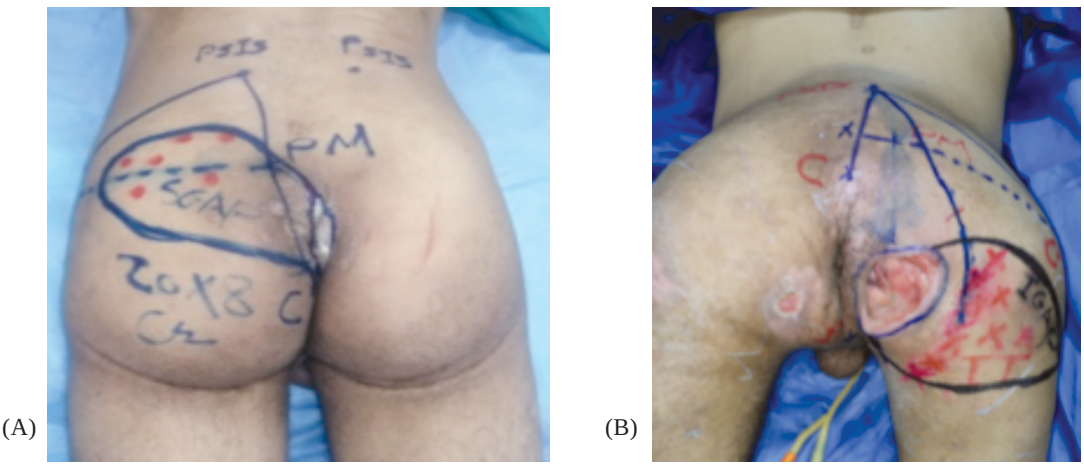

Fig. (2): Marking and design of gluteal artery perforator flaps. (A): SGAP flap, and (B): IGAP flap.

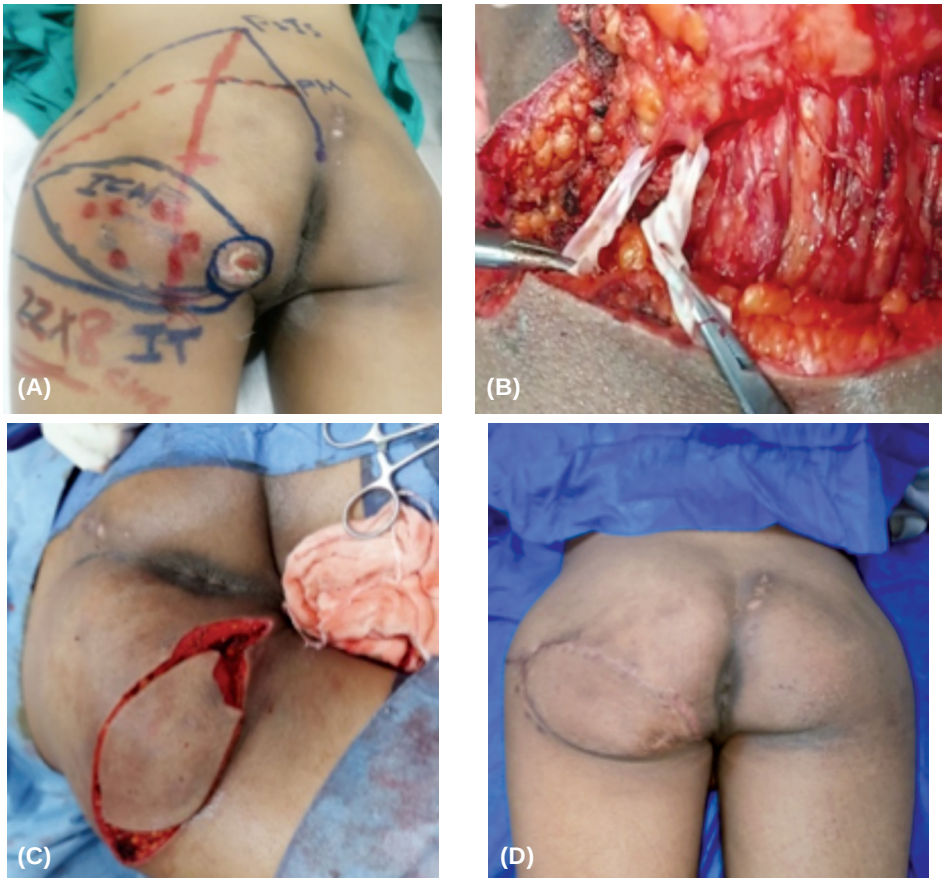

Fig. (3): A 39-year- old ambulant male developed grade IV left ischial pressure ulcer, with a final defect 13 cm x 6 cm. A 22 cm x 8 cm IGAP flap was planned and the flap was advanced to the defect area over two perforators without postoperative complications. (A): Pre-operative identification of the perforators with Doppler and marking of IGAPF borders. (B): Intraoperative photo shows flap dissection and isolation of two perforators. (C): Intraoperative photo of the dissected flap without mobilization, showing its relation to the defect. (D): Three-month postoperative photo shows good healing of the flap.

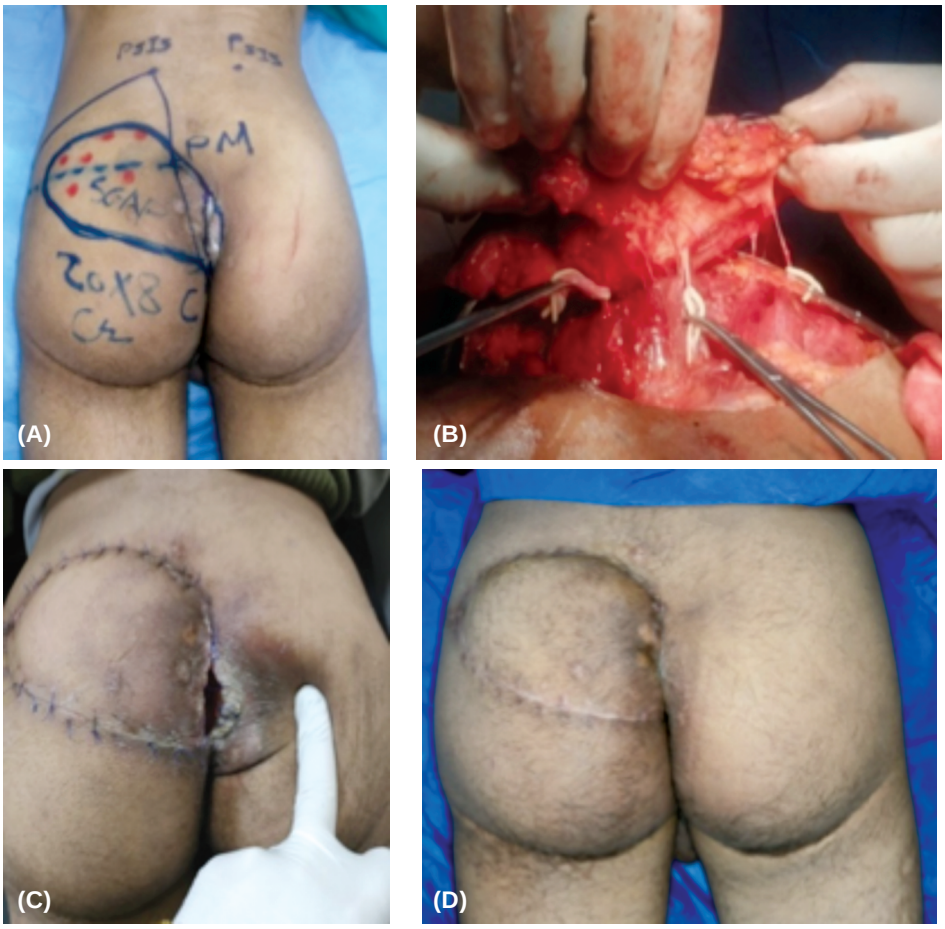

Fig. (4): A 57-year- old diabetic ambulant male patient developed grade IV sacral pressure ulcer, with a final defect 14 cm x 6 cm. A 20 cm x 8 cm SGAP flap was planned and the flap was advanced to the defect area over three perforators. Wound edge dehiscence was observed postoperatively, which was managed with secondary suturing. (A): Preoperative identification of the perforators with Doppler and marking of SGAPF borders. (B): Intraoperative photo shows flap dissection and isolation of three perforators. (C): Postoperative photo shows wound edge dehiscence. (D): Three-month postoperative photo shows good healing of the flap.

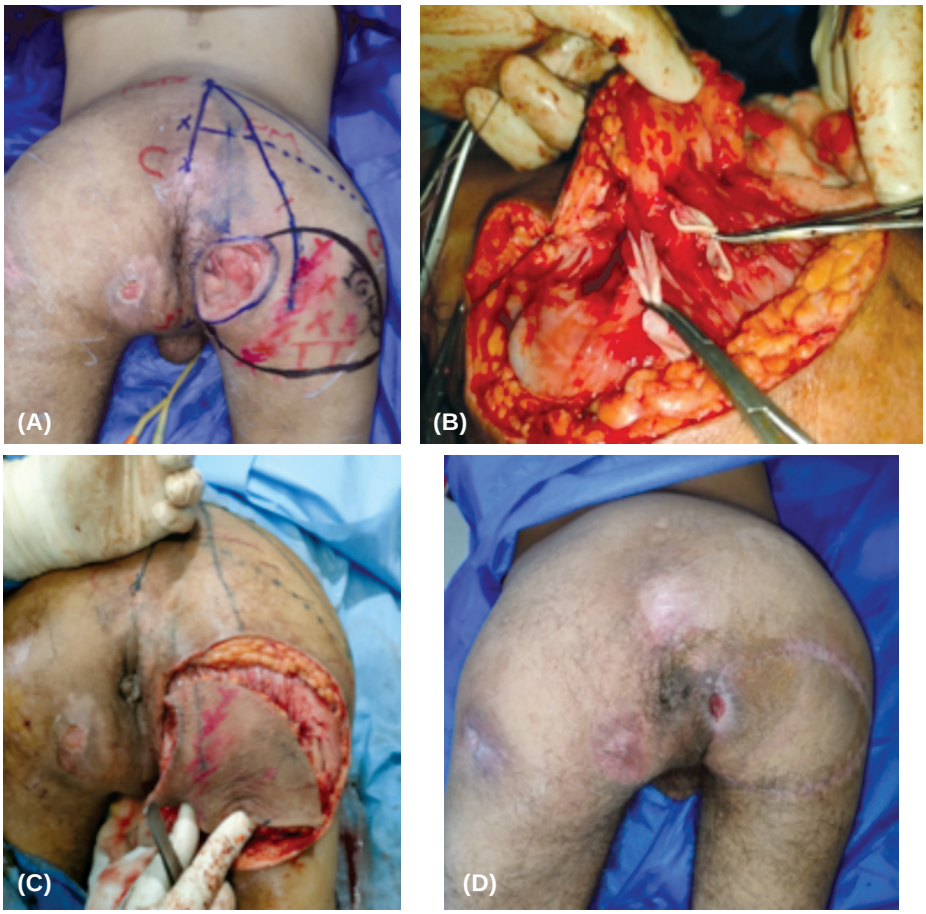

Fig. (5): IGAP flap for right ischial ulcer. (A): Pre-operative identification of the perforators with Doppler and marking of IGAPF borders. (B): Intraoperative photo shows isolation of two perforators. (C): Intraoperative photo of the dissected flap without mobilization, showing its relation to the defect. (D): Three months postoperative shows good healing of flap with small area of wound dehiscence.

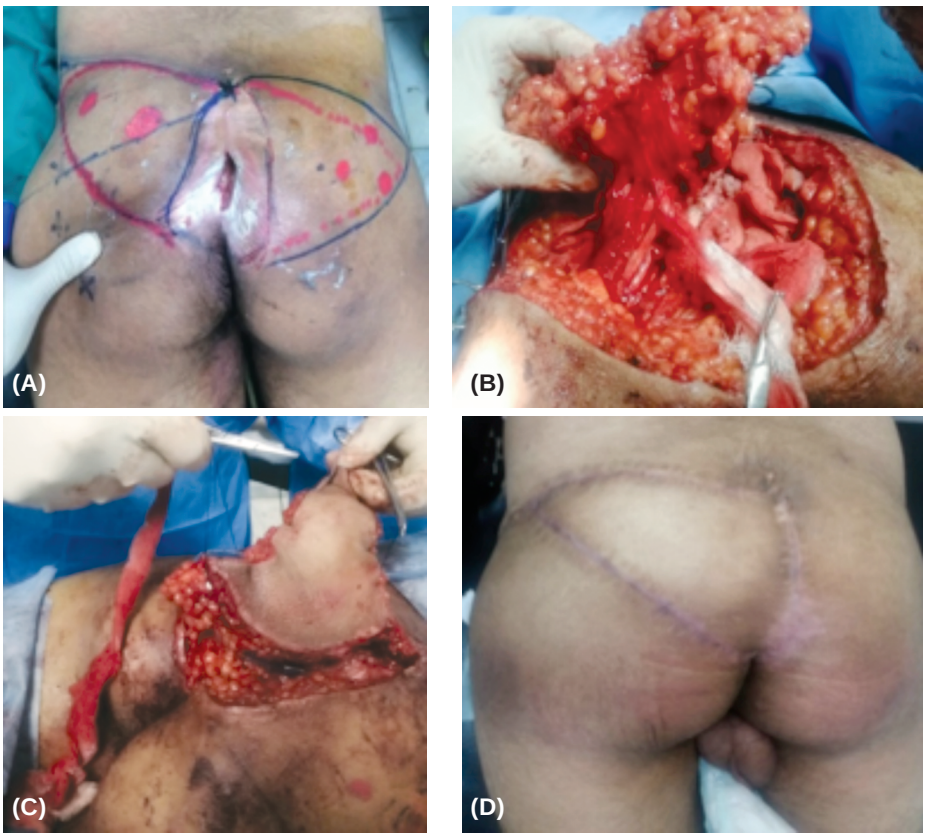

Fig. (6): SGAP flap for sacral ulcer. (A): Pre-operative identification of the perforators with Doppler and marking of SGAPF borders. (B): Intraoperative photo shows flap dissection and isolation of the perforator. (C): Intraoperative photo shows flap advancement to the defect. (D): Three-month postoperative photo shows good healing of the flap.

Post-operative care:

A light sterile dressing was used to cover the wound, with a window left to allow further flap monitoring. The patient was then placed in a warm room, with good hydration (IV fluids and good oral intake). A low-residue diet was given for 2 weeks. The patient was placed in prone position for 3 weeks on air-flotation beds, avoiding any sources of flap compression. Close monitoring of the flap in the first 48 hours was done along with monitoring for any possible complications such as hematoma, seroma, dehiscence and donor side morbidities.

Intravenous antibiotics were prescribed for 2 weeks post-operatively. Donor site drains were removed after one week, and sutures were removed after 3 weeks post-operatively. After that, a sitting protocol was introduced including gradual increase in pressure on the operation site.

Analyzed parameters & follow-up:

Patients were followed-up for 3 months post-operatively. During that, results were compared by photographs all through along with researcher's direct clinical evaluation. All patients' data were recorded and documented (Tables 1,2).

Table (1): Collective demographic data of the patient, ulcer and flap characteristics.

No	Age (Yr)	Sex	Etiology	Status*	Risk Factors	Site	Stage	Time (Yr)	Defect size (cm)	Flap size (cm)	Flap type	Flap design	Perforator Number
1	23	M	Traumatic SCI	P		Sacral	IV	7	13 x 8	20 x 10	SGAP	Advancement	1
2	34	M	Traumatic SCI	P	DM smoker	Sacral	IV	1	15 x 6	18 x 9	SGAP	Advancement	3
3	28	M	Post-orthopedic surgery	A	Smoker	Sacral	IV	6	10 x 7	12 x 9	SGAP	Advancement	2
4	44	M	Traumatic SCI	P	Smoker Low Albumin	Lt Ischial	IV	11	9 x 8	13 x 10	IGAP	Advancement	1
5	30	M	Iatrogenic SCI	P	Anemia	Rt Ischial	IV	4	10 x 5	14 x 8	IGAP	Advancement	2
6	18	M	Iatrogenic SCI	P	Anemia	Lt Ischial	IV	17	7 x 5	11 x 7	IGAP	Advancement	2
7	55	M	Traumatic SCI	P	DM smoker	Sacral	IV	25	15 x 8	20 x 10	SGAP	Advancement	2
8	57	M	Post-orthopedic surgery	A	Smoker Anemia DM	Sacral	IV	2	14 x 6	20 x 8	SGAP	Advancement	3
9	48	F	Traumatic SCI	P	Anemia	Lt Ischial	IV	15	12 x 8	18 x 10	IGAP	Advancement	2
10	39	M	Post-orthopedic surgery	A		Lft Ischial	IV	3	13 x 6	22 x 8	IGAP	Advancement	2
11	51	M	Iatrogenic SCI	P	DM	Sacral	IV	5	8 x 5	11 x 6	SGAP	Advancement	2
12	35	F	Traumatic SCI	P	Low Albumin Anemia	Lt Ischial	IV	9	7 x 7	12 x 8	IGAP	Advancement	2
13	29	F	Iatrogenic SCI	P		Lt Ischial	IV	1	10 x 6	14 x 8	IGAP	Advancement	2
14	46	F	Traumatic SCI	P	DM Anemia	Lt Ischial	IV	13	8 x 7	11 x 9	IGAP	Advancement	1
15	53	M	Traumatic SCI	P	DM smoker	Rt Ischial	IV	10	9 x 7	13 x 9	IGAP	Advancement	2

* P: Paraplegic & A: Ambulatory.

Table (2): Patients' operative details and outcomes.

No.	Operative time (Min)	Hospital stay (Days)	Surgical debridement	Complications	Management	Aesthetic outcome	Patient satisfaction	Recurrence / secondary procedures
1	240	14				Good	Very Satisfied	Nil
2	230	17	Done			Good	Very Satisfied	Nil
3	200	19				Good	Satisfied	Nil
4	240	21				Very good	Very satisfied	Nil
5	190	17				Good	Very satisfied	Nil
6	240	10		Donor site wide scar	Topical creams	Bad	Low Satisfied	Nil
7	180	15	Done			Good	Satisfied	Nil
8	260	10		Wound edge dehiscence	2ry sutures	Poor	Not Satisfied	Nil
9	160	20				Regular	Satisfied	Nil
10	220	14				Very Good	Very Satisfied	Nil
11	170	21		Wound edge dehiscence	2ry intension	Regular	Low Satisfied	Nil
12	180	16				Regular	Satisfied	Nil
13	215	21				Good	Very satisfied	Nil
14	175	13	Done			Good	Satisfied	Nil
15	210	18	Done			Regular	Very satisfied	Nil

Patients were evaluated regarding the aesthetic outcome using the Likert scale (8) in order to assess four parameters (general appearance, surface, color and texture). Each parameter takes a scale from 1 to 5. A score of 4 to 6 considered to be poor, a score of 7 to 9 considered to be bad, a score of 10 to 13 considered to be regular, a score of 14 to 16 considered to be good and a score of 17 to 20 considered to be very good. Patient's psychological satisfaction was also documented using a subjective scale.

Statistical analysis & tests used:

Recorded data was analyzed using IBM SPSS Statistics for Windows software, Version 28.0 (Armonk, NY: IBM Corp., 2021). Quantitative data were expressed as mean with standard deviation (SD) for normally distributed variables and median with interquartile range (IQR) for non-normally distributed variables. Qualitative data were expressed as numbers and percentages. Wilcoxon-signed rank test was used to compare pre and 3 months post-operative aesthetic outcome and patient's psychological satisfaction. The *p*-value ≤0.05 was considered statistically significant.

RESULTS

Our study included 15 adult patients, 11 males and 4 females with a median age of 39 years. 12 (80%) patients were paraplegic while 3 (20%) patients were ambulatory. 7 (46.7%) patients were anemic, and traumatic spinal cord injury (SCI) was prevalent in 8 (53.3%) patients. Most ulcers were in the ischial region (60%), while 40 % were in the sacral region. All patients were in stage IV pressure ulcers.

Eleven (73.3%) patients underwent flap reconstruction at time of ulcer excision, while four (26.7%) patients presented with infected gluteal ulcers underwent surgical debridement first as a separate stage. After 2-3 weeks, a delayed flap reconstruction was performed to them.

As regards defect dimensions, the mean defect length was (10.67±2.80) cm and the mean width was (6.60±1.12) cm. As regards flap dimensions, the mean flap length was (15.27±3.94) cm and the mean width was (8.6±1.18) cm.

In our study, 9 (60%) patients were reconstructed with IGAP flap, while 6 (40%) patients with SGAP flap. The V-Y advancement was the flap design being used in all patients. Most GAP flaps (66.7%) were elevated on two perforators. The median operative time and post-operative hospital stay was 210 minutes and 17 days, respectively.

Regarding the aesthetic outcome, there was a statistically significant improvement 3 months post-operatively as regards the four parameters of the Likert scale (Table 3).

Regarding aesthetic outcome grades, two patients had a very good outcome, seven had a good outcome, one had a bad outcome, and only one had a poor outcome (Table 4).

Regarding post-operative complications, twelve (80%) patients healed eventually without complications, while three (20%) patients had flap complications, two (13.3%) of them developed wound edge dehiscence and only one (6.7%) patient had donor site wide scar. No recurrent cases were reported in our study (Table 5).

Regarding patient's post-operative psychological satisfaction, there was a statistically significant improvement 3 months postoperatively. Seven patients were very satisfied, five patients were satisfied, two patients were low satisfied and only one patient was not satisfied (Table 6).

Table (3): Evaluation of aesthetic outcome by the Likert scale.

Parameters of Likert Scale	Median	IQR	*p*-value
General Appearance:			
Pre	1.00	0.00	<0.001*
Post	4.00	1.00	
Shape:			
Pre	1.00	0.00	<0.001*
Post	3.00	2.00	
Color Match:			
Pre	1.00	0.00	<0.001*
Post	4.00	1.00	
Texture Match:			
Pre	1.00	0.00	<0.001*
Post	3.00	1.00	
Total scale:			
Pre	4.00	2.00	<0.001*
Post	14.00	3.00	

**p*-value ≤0.05 is considered significant by Wilcoxon-signed rank test.

Table (4): Aesthetic outcome evaluation grades of the studied patients.

Aesthetic outcome grades	N (%)
Poor	1 (6.7%)
Bad	1 (6.7%)
Regular	4 (26.7%)
Good	7 (46.7%)
Very good	2 (13.3%)

Table (5): Distribution of the studied patients by the post-operative outcome.

Post-operative complications	N (%)
No complications	12 (80%)
Wound edge dehiscence	2 (13.3%)
Donor site wide scar	1 (6.7%)
Post-operative recurrence	0 (0%)

Table (6): Patients' post-operative psychological satisfaction.

Patient's post-operative psychological satisfaction	Median	IQR	*p*-value
Pre	0	0	<0.001*
Post	2	1	
	N (%)		
Not satisfied	1 (6.7%)		
Low satisfaction	2 (13.3%)		
Satisfied	5 (33.3%)		
Very satisfied	7 (46.7%)		

**p*-value ≤0.05 is considered significant by Wilcoxon-signed rank test.

DISCUSSION

Pressure ulcers are a serious problem that affect different sites in the body causing personal, family, health and social problems among high number of patients, especially the paraplegic and tetraplegic ones. Furthermore, they represent a difficult challenge for plastic surgeons because of their high wound complications and recurrences rates **[9]**.

Traditionally, myocutaneous flaps have been used for reconstruction of gluteal pressure ulcers; however, donor site morbidity, much blood loss and muscle atrophy were among their drawbacks, especially in ambulatory patients. In contrast, superior and inferior gluteal artery perforator flaps have gluteal muscle preservation, less donor site morbidity, less blood loss and less post-operative pain **[10]**.

In our study, most of the studied patients (80%) were paraplegic, while some (20%) were ambulatory. Khurram et al., **[11]** agreed with us and reported 73.3% of their patients were paraplegic.

In the literature, pressure ulcers are a common problem among long-term hospitalized patients, geriatric people and those with spinal cord injuries. Traumatic spinal cord injury was the most prevalent in our study (53.3%). Lindqvist et al., **[12]** agreed with us and observed, in their retrospective study, that 67.0% of patients had traumatic SCI. Unlike our study, stroke was prevalent in 43.3% of patients in Tzeng et al., study **[13]**.

In our study, a strong correlation was found between paraplegia and age, in which younger patients were in the paraplegic status. These findings were correlated with the literature, in which traumatic spinal cord injuries are found in young patients, and are mostly related to road traffic accidents, gunshot injuries or fall from heights **[14]**.

In our study, the highest incidence of gluteal ulcers was in the ischial region (60%), which was consistent with other studies **[12,15]**. This could be explained by the fact that most of our patients were wheel-chair bounded ones, with lack of knowledge of pressure ulcers preventive measures. In contrast, Han et al., **[16]** reported the predominance of sacral region (63.2%) in their study, which could be explained by the greater frequency of supine position among their individuals.

In the current study, we did not skeletonize the perforator vessel for any of the flaps. In agreement with that, Khurram et al., **[11]** reported that full perforator skeletonization increased the risk of perforator twist, kink or injury, resulting in complications like vasospasm, blood flow blockage and eventually total flap loss. Koshima et al., approved the same concept of flap safety, while Verpaele et al., opposed it and recommended the need for full vessel skeletonization **[17]**.

In our study, most of GAP flaps were elevated on two perforators (66.7%). We believed that multiple perforators increased the vascular inflow, which reduces possibilities of flap failure. In agreement with us, Rahman et al., **[18]** had 66.66% of their SGAP flaps elevated on two perforators. Unlike our study, Lin et al., **[19]** had 76.6% of their SGAP flaps elevated on one perforator, and reported that multiple perforators restrict flap mobility. Chih-Hsun and Ma **[17]** reported, in their comparative study, no significant differences between two perforator groups and showed that both single and multiple perforator flaps could achieve successful pressure ulcers reconstruction.

In our study, the V-Y advancement was the flap design being used in all patients. We believed that this versatile design allowed for easy translation of the flap along with preservation of the integrity of gluteal donor area so as to be available for future use in cases of recurrent ulcerations. Yasar et al., **[6]** agreed with us and reported that better outcomes could be obtained if the perforator flaps was advanced to the defective area.

Regarding the aesthetic outcome in our study, there was a statistically significant improvement in all four parameters of the Likert scale when compared pre and 3 months post operatively. Sakr

et al., **[20]** agreed with our study and reported a significant improvement in the aesthetic outcome of perforator flaps when being evaluated by the same scale. In addition, their results were also consistent with our study in that most of their patients had scored a good aesthetic outcome.

In the current study, 80% of patients showed no post operative complications, while 20% of had complications. Wound edge dehiscence was reported among two (13.3%) patients, and required secondary suturing for one patient, while it healed by secondary intention for the other one. In addition, donor site wide scar was reported among one (6.7%) patient, and was managed with topical creams. Our results were not far from the results of Vivek et al., **[21]**, in which wound dehiscence was reported among one (10%) patient and was managed by secondary suturing.

In our study, no flap venous congestion, hematoma or seroma were reported. We believed that this might be due to the use of drains in all of our surgical procedures as well as our attention not to remove it except after an appropriate postoperative time. Bali et al., **[22]** agreed with our study and advised the use of drains after reporting a total flap loss due to venous insufficiency which was caused by hematoma around the pedicle.

In our study, there was a statistically significant improvement regarding the patient's postoperative psychological satisfaction when compared pre and 3 months post operatively. Seven (46.7%) patients were very satisfied, while five (33.5%) patients reported being satisfied. In addition, two (13.3%) patients had low satisfaction due to donor site scar and wound dehiscence, while only one (6.7%) patient was not satisfied because of wound dehiscence. In Tzeng et al., **[13]** study, the degree of patient's satisfaction was also evaluated, in which all patients were satisfied by the outcome except five patients, two of them were unsatisfied about wound edge dehiscence, while the other three were unsatisfied about partial flap necrosis.

Limitations:

Limitations of our study included the small sample size (15 patients) and the short postoperative follow-up period (3 months). Also, the study did not focus on a specific anatomical site of pressure ulcers in the gluteal region, resulting in different patient numbers for each anatomical site, which made samples being more heterogenous. In addition, rehabilitation data of our patients was not available. CT angiography or MR angiography was not used for preoperative mapping of perforators. Flap thickness, perforator's location, size, length and the distance between perforators were not also measured. A further study with an adequate sample size and a longer follow-up period along with available rehabilitation data is recommended for better evaluation of the outcomes in terms of morbidity and recurrence.

Conclusion:

Gluteal artery perforator flaps had a satisfactory aesthetic outcome in terms of all parameters of the Likert scale, with considerable patient's satisfaction and low complication rates. In the evolving era of perforator flaps, our study concluded that the superior and inferior gluteal artery perforator flaps, with their safe anatomical basis, less morbidity and versatility in design, are reliable and effective alternatives in reconstructing pressure ulcers of the gluteal region.

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