

# Prophylactic muscle flaps (PMFs) in high-risk vascular surgery patients

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## BACKGROUND:

Vascular surgery-related groin complications pose a significant healthcare burden and can lead to catastrophic outcomes. In an effort to reduce these complications, we have initiated the use of “prophylactic” muscle flaps in high-risk groin patients. The purpose of this study is to evaluate the efficacy and benefit of PMFs.

## METHODS:

A retrospective cohort study was performed on patients undergoing open vascular surgery through a groin incision between 2005 and 2010. Patients receiving prophylactic muscle flaps at their initial surgery were compared to those patients not receiving a flap (control). Significant variables predicting complications were used in a multivariate analysis to derive a risk scoring system.

## RESULTS:

Sixty-eight prophylactic flaps in 53 patients were compared to 195 open vascular procedures without flaps in 178 patients. Patients receiving prophylactic flaps had lower rates of overall complications (16.2 percent vs. 50.3 percent,  $P<0.001$ ), infections (1.5 percent vs. 38.5 percent,  $P<0.001$ ), seroma (0 percent vs. 7.2 percent,  $p=0.023$ ), and lymphocele (1.5 percent vs. 15.4 percent,  $p=0.002$ ). Patients who received a prophylactic flap experienced significantly less groin wound complications (OR=0.17,  $p<0.001$ ). Multivariate regression of control group patients demonstrated that obesity (OR=2.1 (1.001-4.49),  $p=0.05$ ), smoking (OR=2.7 (1.37-5.16),  $p=0.004$ ), re-operation (OR=3.5(1.41-8.63),  $p=0.007$ ), and prosthetic graft reconstruction (OR=2.0 (1.03-3.78),  $p=0.04$ ) were associated with postoperative complications. Significant variables were weighted and used to derive the Penn Groin Assessment Scale (PGAS) (Table 1). Patients with higher PGAS scores had significantly higher rates of complications. A  $PGAS\geq 3$  was determined to be a significant threshold for complications and secondary salvage flaps ( $p<0.001$ ).

Using cost data we determined that each groin wound complication added an additional \$12,677 per complications. Furthermore, for every 3 PMFs performed we prevented 1 complication. During the study period we prevented 23 complications and saved \$300k in direct cost. Using the PGAS our savings approached \$700k.

## CONCLUSIONS:

We report that PMFs are safe, efficacious, and cost efficient. PMFs in select high-risk patients reduce complications and morbidity. We have demonstrated that groin wound complications are morbid and costly, adding at least \$1.1M in additional costs. The PGAS is a sensitive tool that accurately predicts complications and can be used to select PMF candidates. We report cost saving of approximately \$300k from our utilization of PMFs during the study which could have approached \$700k if the PGAS was utilized. We have defined a threshold of  $PGAS\geq 3$  as associated with significant complications; patients in this group will derive significant benefit from PMFs. We have provided an easy to use algorithm for preoperative groin assessment.

Table 1. Penn Groin Assessment Scale (PGAS)				
score	Low (0-2)	Intermediate (3-4)	High ( $\geq 5$ )	
n	102	62	31	
complications	31.7%	64.1%	77.4%	<0.001
seroma	5.8%	6.3%	12.9%	0.4
lymphocele	12.5%	17.2%	19.4%	0.55
hematoma	4.8%	1.6%	6.5%	0.45
infection	20.2%	50.0%	71.0%	<0.001
superficial	13.5%	50.0%	58.1%	<0.001
deep	10.6%	10.9%	29.0%	0.028
breakdown	10.6%	17.2%	48.4%	<0.001
secondary flap	13.5%	23.4%	41.9%	0.003

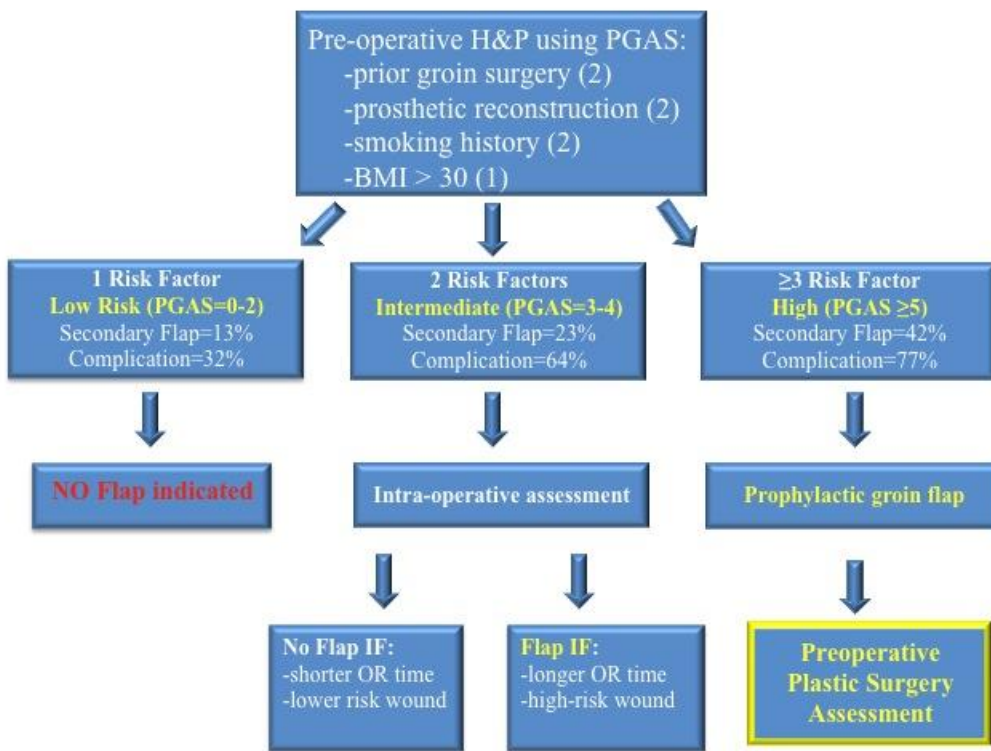


Figure 1. Evidence-based algorithm for management of complex groin wounds.