

THE FINANCIAL IMPLICATIONS OF COMPUTED TOMOGRAPHIC ANGIOGRAPHY IN DIEP FLAP SURGERY: A COST ANALYSIS

Dear Editor,

Computed tomography angiography (CTA) is an increasingly utilized technique in the preoperative planning of deep inferior epigastric artery perforator (DIEP) flaps, shown to improve operative outcomes and reduce surgical times.¹⁻⁵ Although the contraindications, side-effects, and radiation exposure associated with CTA have been discussed in these studies, there has not been a discussion of the financial costs associated with CTA.

In the climate of many hospital systems, the financial cost of any intervention or investigation is a major factor dictating its widespread use. This has been a topical factor in DIEP flap surgery, and means to reducing costs in autologous breast reconstruction have been sought.^{6,7} In examining these costs, we compared the cost of performing a CTA scan to the cost savings associated with the results of the scan. In our previous studies, we have shown that CTA can significantly reduce operative time.^{3,5} In a controlled series of 85 patients at our institution, CTA reduced surgical time by 90 min per case.⁵ In addition, length of stay has been shown to be reduced by a mean time of 1 day per patient. Although this did not reach statistical significance (*P* value was 0.06), this has been described as the norm. We thus conducted a cost analysis of the use of CTA at our institution based on this reduction in surgical time.

With surgical time significantly reduced following CTA, the cost reduction in saving 90 min of operating time in a DIEP flap has been calculated at US\$35 per min at our institution or US\$3,150 for the entire 90 min

of surgery (see Table 1). This calculation is based on the lack of any extra equipment costs, but the costs largely associated with personnel. In this series, our routine comprised a surgical team (one surgeon and two training surgeons), nursing team (one scrub nurse and one scout nurse), and an anesthetic team (one consultant anesthetist and one anesthetic nurse). In addition, length of stay has been shown to be reduced by an average of 1 day per patient, at a cost saving of US\$750. This reduction in length of stay is largely because of improvements in operative outcome shown to be associated with the use of CTA, such as a decrease in theater take-backs, flap related complications, and donor-site complications. The total cost savings are thus calculated at US\$3,900. The longer-term cost savings associated with treating these complications are significant but not included in these calculations.

The direct cost of performing a CTA is US\$490 at our institution, which includes the costs associated with equipment, the radiographer and radiological reporting of the scan (US\$390), and the cost associated with the intravenous contrast used and cannulation (US\$100). Notably, at our institution, the surgeon does spend time interpreting the scan as well, but this is unpaid time that the surgeon advocates as it is of benefit to the surgeon intraoperatively.

Table 1. Financial Costs and Cost Benefits of Performing a Preoperative Computed Tomography Angiogram (CTA)

Expenses		Cost benefits	
CT Angiogram	\$390	Theatre time (90 min)	\$3,150
Radiologist		Surgical team	
Radiographer		Nursing team	
Contrast	\$95	Anesthetic team	
IV Cannulation			
equipment	\$5	Length of stay (1 day)	\$750
Surgeon reporting time	0		
Total expenses	\$490	Total benefits	\$3,900

All currency is in US dollars.

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In some institutions, and indeed ours in the past, color duplex ultrasound was a modality utilized for preoperative imaging (at a cost of US\$250), and in some institutions, magnetic resonance angiography is a newly utilized modality (at a cost of US\$650). These modalities have not been formally shown to improve surgical times or operative outcomes, and so while not directly comparable to CTA, can be seen to have comparable direct costs.

As such, the calculated cost savings of performing a single preoperative CTA prior to a DIEP flap for breast reconstruction is in the order of US\$3,410. This is a strong motivator for hospital systems to support the increased use of CTA in this role. As it is in the interest of the surgeon, patient and now shown to also benefit the hospital funding bodies, the use of preoperative CTA for DIEP flaps is strongly supported.

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