



# Cranial Flap Fixation: An Opportunity for Cost Containment

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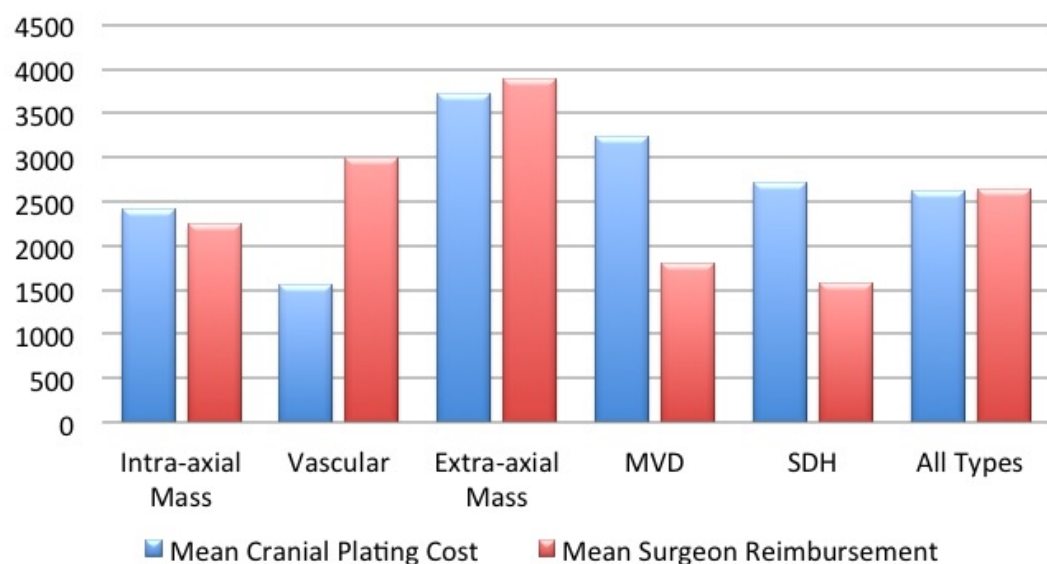
## Introduction

Unlike some procedures with inherent implant costs (e.g. joint replacement, neurostimulation), craniotomy was successfully performed for over a century before the advent of cranial plating. In recent years, plate fixation of craniotomy flaps has become routine, with little attention paid to associated costs. We reviewed the usage and costs of cranial plating and performed a systematic literature review of clinical outcomes of various craniotomy flap fixation techniques.

## Methods

Invoices from a consecutive cohort of patients undergoing first-time craniotomy were reviewed to determine cranial plating usage and costs over a three month period at a single hospital. This was compared to typical Medicare surgeon reimbursement for these procedures. We also performed a systematic literature review of costs and clinical outcomes following various craniotomy flap fixation techniques.

Mean Cranial Plating Cost and Mean Surgeon Reimbursement According to Type of Craniotomy



## Results

33 craniotomies (27 supratentorial, 6 infratentorial) were performed for various indications: intra-axial mass (12), vascular (7), extra-axial mass (7), MVD (5), SDH (2). Invoices were available for 32 of these. Mean cranial plating costs (\$2628, range \$747-6621) roughly equalled mean surgeon reimbursement (\$2644, range \$1190-4533) for these cases. Current costs are approximately eightfold higher than previously reported in a 2002 publication. Literature review yielded two small pilot randomized controlled trials and multiple retrospective case series reporting on a variety of fixation techniques.

Costs by Vendor and Choice of Implants

	4mm screw	2-hole plate (12mm)	Large burr hole cover (17-24mm)	Option #1 (3 burr hole covers, 18 screws)	Option #2 (3 2-hole plates, 6 screws)
Company #1	\$88	\$73	\$278	\$2,418	\$747
Company #2	\$75	\$62	\$236	\$2,055	\$635
Company #3	\$46	\$36	\$141	\$1,259	\$385
Company #4	\$44	\$50	\$158	\$1,260	\$414

## Conclusions

The expense of cranial plating has far outpaced inflation in recent years and frequently exceeds surgeon reimbursement for craniotomies. Multiple options for cranial flap replacement exist, and available evidence does not allow definite conclusions regarding superiority of any particular technique. We suggest that cranial flap fixation presents an opportunity for substantial cost savings.

### Learning Objectives

- 1) Describe options for cranial flap fixation and their costs
- 2) Describe available evidence regarding bone flap fixation
- 3) Identify the need for further trials to establish the cost-effectiveness of various fixation techniques.

### References

- Smith SC, Pelofsky S: Adaptation of rigid fixation to cranial flap replacement. *Neurosurgery* 29(3): 417-8, 1991.
- Winston, Ken R., and Marjorie C. Wang: Cranial bone fixation: review of literature and description of a new procedure. *Journal of Neurosurgery* 99(3): 484-488, 2003.