

Performance of Minimally Invasive Sagittal Synostectomy with Supine Patient Positioning: Technical Note

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Introduction

Minimally invasive synostectomy with post-operative helmet orthosis is increasingly used by neurosurgical providers in the management of sagittal craniosynostosis diagnosed in infancy. Since its introduction in the 1990s, the technique has evolved with many practitioners utilizing a limited osteotomy overlying the sagittal suture (1). Despite the reduction in need to access the lateral skull surface, modified prone/sphinx positioning remains popular with many neurosurgeons.

Prone positioning in craniofacial surgery is associated with both real and theoretical risks. Intraoperative extubation in the modified prone position presents the potential for catastrophic anoxic injury. Cervical hyperextension presents the potential for neurologic injury in the setting of congenital craniocervical spinal abnormalities to include segmentation anomalies and Chiari malformation (2). Alternative patient positioning with comparable access to the midline may enhance patient safety in this surgical population.

Methods

The authors utilized supine positioning with the head turned laterally on a horseshoe headholder on three consecutive patients undergoing minimally invasive sagittal synostectomy.

Results

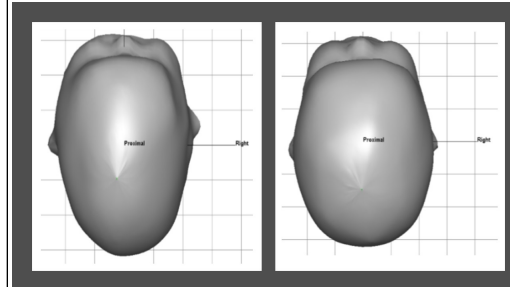
Surgical time, estimated blood loss, post-operative hematocrit, transfusion volume, length of stay were reviewed for these cases, and found to be comparable to three cases within our program performed in the modified prone position. Synostectomy orientation and width were comparable. Post-operative correction of cephalic index were excellent both groups.



Pre and Postoperative Characteristics of Patients

	SUPINE1	SUPINE2	SUPINE3	PRONE1	PRONE2
DATE OF DISCHARGE	3/17/2017	2/3/2017	4/21/2017	1/12/2017	10/19/2016
WEIGHT	5 kg	6 kg	5.9	7.5 kg	7.2 kg
SURGICAL TIME	65 min	81 minutes	65 min	66 min	56 min
TRANSFUSION	0 cc	0 cc	0 cc	0 cc	0 cc
CRYSTALLOID	180 cc	200 cc	200 cc	120 cc	145 cc
PRE-OP HCT	37.3	36.5	32.7	N/A	24.6
POD#1 HCT	26.5	25.9	21.4	24.5	22.2
PRE-OP CEPH INDEX	69.40%	76.20%	66.70%	68%	69%
POST-RX CEPH INDEX	85.80%	81.3%	77.40%	75%	78%

Pre and Post Optical Scans



An illustrative case of a patient treated with minimally invasive sagittal synostectomy in the supine position. Pre (left) and post (right) optical scans are shown.

Conclusions

In this small series, minimally invasive synostectomy for sagittal craniosynostosis was performed with conventional supine positioning, achieving comparable surgical outcomes to modified prone positioning. Supine positioning offers potential advantages to include reduced anesthetic risk and reduction in the need for pre-operative imaging in this patient population.

Learning Objectives

By the conclusion of this session, participants should be able to:

- 1) Describe the anesthetic concerns of the sphinx position.
- 2) Replicate the technique for lateral minimally invasive sagittal synostectomy.

References

1. Jimenez, DF, Barone, CM, Cartwright CC, et al. Early management of craniosynostosis using endoscopic-assisted strip craniectomies and cranial orthotic molding therapy. *Pediatrics* 2002; 110: 97-104
2. Stricker PA, Fiadjoe JE. Anesthesia for Craniofacial Surgery in Infancy. *Anesthesiology Clin* 2014; 32: 215-235.