

Introduction

The sitting cervical position affords advantages over prone positioning for elective posterior cervical decompression and fusion. A potential disadvantage is the risk for venous air embolism.

Methods

We retrospectively identified all adult elective posterior cervical surgeries at our institution between 2009 and January of 2014. Using ICD-9 coding, we searched for incidences of air embolism, myocardial infarction, pulmonary embolism, and deep vein thrombosis. Operative time, estimated blood loss, and case type distribution were also recorded. Surgeries for traumatic fracture, tumor, or which involved occipital-cervical junction were excluded.

Results

Between 2009 and January of 2014, 558 surgeries were performed in the sitting cervical position and 20 in the prone position. No venous air embolisms were reported for either group. The average surgical time was 1 hour 46 minutes for prone positioned patients and 1 hour 25 minutes for surgeries in the sitting position (p=0.003, Table 1). 30-day perioperative complications among the sitting position patients included 3 myocardial infarctions, 1 pulmonary embolism attributed to venous thrombosis, and 2 other patients with deep venous thromboses, for a total cardiovascular complication rate of 1.1% (Table 2).

Table 1. Operative time and blood loss among prone and sitting position cervical surgery subgroups.											
		Prone					Sitting				
		N	EBL ^a (NL ^b)	Induction to close (hr:min)	Incision to close (hr:min)	Induction to incision (min) ^c	N	EBL ^a (NL ^b)	Induction to close (hr:min)	Incision to close (hr:min)	Induction to incision (min) ^c
Levels	1-2	3	115 (1)	2:22	1:42	40	285	60 (37)	1:34	1:04	30
	≥ 3	17	154 (7)	2:28	1:47	41	273	99 (23)	2:24	1:46	38
Surgery	Laminectomy	17	157 (7)	2:25	1:45	40	451	79 (53)	1:54	1:21	34
	Discectomy	0					62	47 (7)	1:33	1:03	30
	Fusion	3	100 (1)	2:13	1:32	41	45	122 (0)	3:19	2:33	46
	Total	20	147 (8)	2:27	1:46	41	558	79 (60)	1:59	1:25	34
^a Estimated blood loss (EBL) in mL. was reported as minimal for 25 patients in the sitting position. 50 mL was substituted as an approximation of minimal blood loss for these patients. ^b EBL was not listed (NL) for 8 patients in the prone position and 60 patients in the sitting position. Operative times listed spanned from time of induction to the end of surgery, time of incision to the end of surgery, and time of induction to time of surgery. ^c Minutes rounded on raw data. Hr = hour. Min = minutes.											

Table 2. 30-Day perioperative complications			
Complication	ICD-9 code	Prone (n=20)	Sitting (n=558)
Acute myocardial infarction	410	0	3
Air embolism	958.0	0	0
Arterial embolism and thrombosis NOS, of unspecified artery	444.9	0	0
Certain early complications of trauma	958	0	0
Complication of surgical procedure NOS	998.9	0	0
Occlusion of cerebral arteries	434.9	0	0
Pulmonary embolism	415.1	0	1 ^a
Transient cerebral ischemia	435.9	0	0
Venous embolism and thrombosis of lower extremity	453.4	0	3 ^a
Death			2 ^b
^a Pulmonary embolism was due to venous thrombosis. ^b One mortality was due to acute myocardial infarction. The second mortality was due to pneumonia.			

Conclusions

Our study adds to the literature supporting the safety of the sitting cervical position. The sitting position is preferred by many surgeons at our institution. It provides a dry surgical field, easily verified spinal alignment prior to fusion, and superior visualization on intraoperative x-rays due to reduced shoulder artifact. Furthermore, our data suggest that operative times may be shorter. While the risk of venous air embolism exists, clinically significant occurrences are extremely rare. Given our large volume of surgeries in the sitting position, we believe the advantages outweigh the risks.

Learning Objectives

- 1) Describe the advantages of the sitting cervical position
- 2) Recognize the rarity of a significant venous air embolism in the sitting cervical position

References

1. Gan C, King JA, Maartens NF. The role and safety of the sitting position in instrumented cervical surgery. J Clin Neurosci. Mar 2016;25:75-78.

2. Porter JM, Pidgeon C, Cunningham AJ. The sitting position in neurosurgery: a critical appraisal. British Journal of Anaesthesia. Jan 1999;82(1):117-128.