Utility of Routine Post-operative Computed Tomography in Elective Craniotomy

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Introduction

Early post-operative CT scanning after elective craniotomy is commonly performed to assess surgical results and for early detection of complications. Although commonplace, this practice exposes the patient to radiation and is an extra cost that may not be warranted. The purpose of this study was to assess the information gained from an early post-operative CT after elective craniotomy, and to see if this led to a surgical intervention.

Methods

A retrospective review of a prospectively collected database of all elective craniotomies done at a single institution over a 12 month period (January 1st 2014 - December 31st 2014), and with an early post-operative CT scan (<6 hours). Primary endpoint was need for a surgical intervention (return to operating room or placement of an external ventricular drain). Post-operative neurologic exam, age, pre-operative labs, location of surgery, pathology, and time from end of surgery to CT scan were analyzed.

Exclusion Criteria

- -Age < 18
- -Trauma or emergent surgery
- -Stereotactic biopsies, transphenoidal surgery
- -Burrhole surgery, ventriculostomy
- -Lack of CT scan and/or documented exam

Secondary Variables Assessed

- -Coagulation studies
- -Pathology
- -Location of craniotomy
- -Neuronavigation usage
- -Age
- -Gender
- -Size of mass
- -Time from “Out of OR” to CT of head

Chi-square test comparision of CT scan results and neurologic examination

	Results				
	Clean	Blood in Cavity	IVH	Hematoma	Subdural
Baseline	135 (130.23) [0.17]	40 (39.94) [0.52]	8 (12.15) [1.42]	5 (6.08) [0.19]	3 (2.60) [0.06]
Expected Deficit	10 (12.95) [0.67]	5 (3.97) [0.27]	2 (1.21) [0.52]	2 (0.60) [3.22]	0 (0.26) [0.26]
Unexpected deficit	5 (6.82) [0.48]	1 (2.09) [0.57]	4 (0.64) [17.78]	0 (0.32) [0.32]	0 (0.14) [0.14]

No association between imaging findings and neurologic outcome

Results

236 patients had elective craniotomies performed with an early post-operative scan. One patient (0.4%) needed return to the OR based on imaging findings and exam. Imaging studies were categorized as 1) no complication, 2) blood in resection cavity, 3) intraventricular hemorrhage, 4) hematoma, 5) subarachnoid hemorrhage, and 6) subdural hematoma. There was no significant difference between CT scan findings and the primary or secondary endpoints. No association between post-operative neurologic examination (baseline, expected deficit, unexplained deficit) and imaging results was seen. A conservative estimate of the total cost was $46,975.

Conclusions

A post-operative CT scan after elective craniotomy does not correlate with neurologic outcome. Abnormal findings are common, but these do not lead to surgical intervention and poorly detect complications. It is unnecessary in non-comatose patients; and the neurologic exam can be used to monitor post-operative complications, where an unexpected decline in status should prompt imaging studies to be performed.

Learning Objectives

By the conclusion of this session, participants should be able to 1) see that performing routine and regular neurologic examinations after surgery is a reliable proxy for intracranial complications, 2)new imaging findings after surgery does not correlate with neurologic deficits or surgical complication, and 3) discuss if the medical cost and exposure to unnecessary radiation is unwarranted.