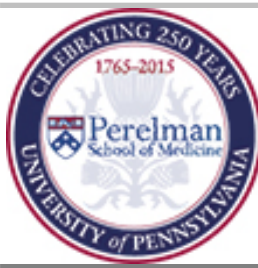




Risk Factors For Surgical Site Infections After Cranial Neurosurgery: An Analysis of 9,705 Cases over 8 years

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Learning Objectives

by the conclusion of this session, participants should be able to Identify modifiable and non-modifiable risk factors for surgical site infections in cranial surgery.

Introduction

Surgical site infection (SSI) can be a significant cause of patient morbidity and mortality after cranial surgery. Chlorhexidine has been found in large analyses to provide superior infection prevention than traditional iodine-based scrub solutions. We sought to analyze the association with postoperative infection of various known risk factors as well as the use of chlorhexidine-based high-alcohol scrub solutions.

Methods

We analyzed administrative data (2003-2010) for patients undergoing cranial neurosurgery at two university-associated hospitals. Patients (“cases”) who were readmitted with a diagnosis of infection or who underwent surgical re-exploration for infection were identified. Control patients were then randomly identified matched for index operation CPT code and by year. Chart review was performed of case and control patients. Logistic regression was used to perform univariate and multivariate analysis to identify risk factors associated with SSI.

Results

9,191 cranial neurosurgery cases were performed and 209 infections were identified (2.3%). Within the administrative dataset, multivariate analysis found functional (OR 2.6, 95% CI: 1.8 – 3.7, $p < 0.0001$) and CSF diversion (OR 1.7, 95% CI: 1.2 – 2.5, $p = 0.005$) procedures were associated with increased risk of SSI. Redo procedures were not associated with increased SSI risk.

Comparing the cases and controls ($n = 209$ in each group, matched on procedure subtype) any smoking history, redo surgery, and length of stay were associated with increased risk of infection on univariate analysis. Age, gender, obesity, diabetes, use of a surgical drain, operative time, prior radiation therapy to site, and use of high alcohol prep were not associated with SSI risk. On multivariate analysis smoking (OR 1.7, 95%CI: 1.1 – 2.6, $p = 0.015$), redo surgery (OR 2.2, 95%CI: 1.3 – 3.5, $p = 0.002$), and length of stay (OR 1.02, 95%CI: 1.01 – 1.04, $p = 0.004$) were associated with increased SSI risk.

Conclusions

Though SSI risk varied by surgery type, the primary controllable risks for SSI after cranial surgery in our analysis were smoking and length of stay. Even adjusting for other factors, use of high alcohol prep (e.g. chloraprep) was not associated with reduced SSI rates.

References

- Chiang, H.-Y., Kamath, A. S., et al. (2014). Risk factors and outcomes associated with surgical site infections after craniotomy or craniectomy. *JNS*, 120:509-521.
- Erman, T., Demirhindi, H., et al. (2005). Risk factors for surgical site infections in neurosurgery patients with antibiotic prophylaxis. *Surgical Neurology*, 43:107-113.
- Horan, T. C., Culver, D. H., Gaynes, R. P., Jarvis, W. R., Edwards, J. R., & Reid, C. R. (1993). Nosocomial Infections in Surgical Patients in the U.S., January 1986-June 1992. *Inf Ctrl Hosp Epi*. 14(2), 73-80.
- Korinek, A., Golmars, J., et al. (2005). Risk factors for neurosurgical site infections after craniotomy: a critical appraisal of antibiotic prophylaxis on 4578 patients. *Br J Neurosurg*, 19(2): 155-162.
- Lee, I., Agarwal, R. K., Lee, B. Y., & Fishman, N. U. (2010). Systematic Review and Cost Analysis Comparing Use of Chlorhexidine with Use of Iodine for Preoperative Skin Antisepsis to Prevent Surgical Site Infection. *Inf Ctrl Hosp Epi* 31 (12), 1219-1226.
- McClelland III, S. (2007). Postoperative intracranial neurosurgery infection rates in North America versus Europe: A systematic analysis. *APIC&E*, 570-573.
- McClelland, S., & Hall, W. A. (2007). Postoperative Central Nervous System Infection: Incidence and Associated Factors in 2111 Neurosurgical Procedures. *Clin Infect Dis*, 45-55.
- Narotam, P., van Dellen, J. R., et al. (1994). Operative Sepsis in Neurosurgery: A Method of Classifying Surgical Cases. *Neurosurgery*, 409-416.
- Valentini, L. G., Casali, C., et al. (2008). Surgical Site Infections after Elective Neurosurgery: A Survey of 1747 Patients. *Neurosurgery Volume 62 Number 1*, 88-94.