



Thrombo-embolic Events Following Craniotomy: Risks and Benefits of Anticoagulation

Pierre-Olivier Champagne MD; Michel W. Bojanowski MD, FRCS(C); Robert Moumdjian; Daniel Shedid MD; Alain Bouthillier MD, FRCS(C)

Notre-Dame Hospital, Centre hospitalier de l'Université de Montréal (CHUM), Montréal, Quebec, Canada



Introduction

Thrombo-embolic events (TEE), including deep venous thrombosis (DVT) and pulmonary embolus (PE), are worrisome complications following a craniotomy. The use of anticoagulants to prevent or treat TEE might put the patients at an increased risk of intracranial hemorrhage after surgery [1,2]. The neurosurgeon must weigh the benefits of anticoagulants against the risks of intracranial hemorrhage. Data is still lacking to offer a safe line of conduct.

Objective

Determine the risks and benefits of prophylactic anticoagulation in patients that underwent a craniotomy.

Methods

A retrospective review of the charts of all craniotomies performed between 2006 and 2012 in a single institution. The charts were screened for the occurrence and risk factors of TEE, the use of prophylactic anticoagulation and the occurrence of intracranial post-operative hemorrhage.

The current presented analysis are based on all the positive cases of TEE (29 cases) compared with a sample of 281 patients randomly selected from the population studied.

Results

2010 craniotomies were performed on 1448 patients. The overall incidence of TEE was 1,6%. Known risk factors for TEE such as age, malignancy and length of surgery did not augment the risk of TEE in our population.

Prophylactic heparin reduced the risk of TEE by a 2,3 factor ($p = 0,027$). Prophylactic heparin did not increase the risk for a post-operative intracranial hemorrhage. Subgroup analysis revealed that even in patients initially operated on for an intracranial hemorrhage, prophylactic heparin did not statistically augment the risk of post-operative bleeding ($p = 0,7$). When combined with prophylactic heparin, early post-operative mobilisation further significantly reduced the risks of TEE (OR: 2,98 $p = 0,01$).

Table 1

	Odds ratio (risk reduction) for TEE	p (%)
Prophylactic heparin (overall)	2,34	$p = 0,0027$
With late mobilisation	1,93	$P = 0,135$
With early mobilisation	2,98	$P = 0,01$
Early Mobilisation alone	1,17	$P = 0,704$

Effects of prophylactic heparin and mobilisation

Conclusions

Prophylactic heparin after a craniotomy significantly reduced the risk of TEE while not augmenting the risk of post-operative intracranial hemorrhage. This remained true even in the population of patients who were operated on for an intracranial bleeding.

The combination of prophylactic heparin and early mobilisation had the greatest effect in reducing the occurrence of TEE, suggesting that there is a benefit to pursue intrahospital prophylactic heparin even in ambulant patients.

References

1. Danish SF , Burnett MG , Ong JG , Sonnad SS , Maloney-Wilensky E , Stein SC : Prophylaxis for deep venous thrombosis in craniotomy patients: a decision analysis. **Neurosurgery** 56(6):1286-1292, 2005.
2. Collen JF , Jackson JL , Shorr AF , Moores LK : Prevention of venous thromboembolism in neurosurgery: a metaanalysis . **Chest** 134 (2) : 237 - 249, 2008.