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Background

Compound skull fractures have conventionally been treated surgically especially when there is evidence of dural penetration. However the evidence for this is limited. This study was to comparatively assess surgical debridement and bedside wash & suturing in patients with compound skull fractures.

Methods

Patients of compound skull fractures with no significant intracranial hematoma were studied for various factors in relation to surgical or conservative management, 'survival without CNS infection', unfavorable neurological outcome and late posttraumatic seizures.

Results

Out of 671 patients with compound skull fractures, 258 patients had complete clinico-radiological details with no significant intracranial hematoma. Of these 207 and 51 were managed conservatively and surgically respectively. There was no significant baseline difference with respect to age, GCS, admission interval and internal compounding between the surgical and conservative groups. The motor vehicular accidents, brain matter herniation and CSF leak were significantly greater in surgical group (p=0.001, <0.001 & 0.04 respectively). In univariate analysis, 'survival with no CNS infection', unfavorable outcome and late posttraumatic seizures had no significant difference among the surgical and conservative groups (p=0.33, 0.1 & 0.36 respectively). Hospital stay and 'CNS infection among survivors' were significantly greater in surgical group (p=0.001). In subgroup analysis, the only factor which tilted the benefit towards surgical intervention was brain matter leak (p=0.01).

Factor		Simple	Elevation	Odds ratio/	p value
		suturing (n=207)	debridement (n=51)	Mean difference	
Age (yrs)		26.3 (+15.5)	27.5 (+12.7)	1.2 (-3.4 to 5.8)	0.62
Males		184 (89%)	44 (86%)	1.3 (0.5 - 3.2)	0.60
Adm. interval (hrs)		36.6 (+78.8)	25.9 (+47.9)	-10.7 (-33.4 to 12.1)	0.36
Mechanism	Motor Vehicular	82 (39.6%)	36 (70.6%)	NA	0.001
	Assault	52 (25.1%)	3 (5.9%)]	
	Fall	46 (22.2%)	7 (13.7%)]	
	Others	27 (13%)	5 (9.8%)]	
Adm. GCS		12 (+4.2)	10.8 (+3.9)	-1.2 (-2.4 to 0.1)	0.07
Internal Compounding		27 (13%)	2 (3.9%)	3.7 (0.8 - 15.9)	0.07
Pneumocephalus		40 (19.3%)	4 (7.8%)	2.8 (1 - 8.3)	0.05
CSF leak		22 (10.6%)	11 (21.6%)	2.3 (1 - 5.1)	0.04
Brain matter herniation		11 (5.3%)	21 (41.2%)	12.5 (5.5 - 28.4)	< 0.001

Baseline characteristics of patients in 'Simple suturing' and

'Elevation debridement' groups

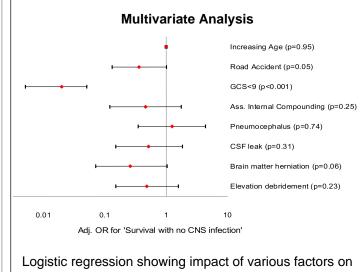
Outcome Assessment						
Outcome variable	Simple suturing (n=207)	Elevation debridement (n=51)	Odds ratio/ Mean difference	p value		
Hospital stay (days)	2.4 (+2.9)	10.2 (+11.5)	7.8 (4.5 - 11.1)	< 0.001		
Late post traumatic seizures	7 (3.7%)	0 (0%)	NA	0.36		
GOS 1-3	53 (25.6%)	19 (37.3%)	1.7 (0.9 - 3.3)	0.1		
Mortality	44 (21.3%)	6 (11.8%)	2 (0.8 - 5.1)	0.13		
CNS infection among survivors	7/163 (4.3%)	10/45 (22.2%)	6.4 (2.3 - 17.9)	0.001		
Survival with no CNS infection	156/207 (75.4%)	35/51 (68.6%)	1.4 (0.7-2.7)	0.33		

While hospital stay & 'CNS infection among survivors' were significantly greater in surgical group (p=0.001), the rest

did	not	show	any	signit	icant	difference
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Subgroups		Survival with no C	Subgroup		
		Simple suturing	Elevation	difference p	
			debridement	value	
Mode of injury	Motor vehicular	56/82 (68.3%)	25/36 (69.4%)	0.31	
	Assault, Fall, Others	100/125 (80%)	10/15 (66.7%)		
GCS	< 9	7/45 (15.6%)	7/19 (36.8%)	0.06	
	9-15	149/162 (92%)	28/32 (87.5%)		
Ass. Internal	Present	20/27 (74.1%)	0/2 (0%)	0.06	
Compounding	Absent	136/180 (75.6%)	35/49 (71.4%)		
Pneumocephalus	Present	32/40 (80%)	3/4 (75%)	0.99	
	Absent	124/167 (74.3%)	32/47 (68.1%)		
CSF leak	Present	17/22 (77.3%)	4/11 (36.4%)	0.03	
	Absent	139/185 (75.1%)	31/40 (77.5%)		
Brain matter	Present	1/11 (9.1%)	12/21 (57.1%)	0.01	
leak	Absent	155/196 (79.1%)	23/30 (76.7%)		

Survival with no CNS infection' among different subgroups showing significantly better outcome in brain matter leak with 'Elevation debridement'



'Survival with no CNS infection'

Multivariate Analysis

In multivariate analysis adjusting for age, mechanism of trauma, admission GCS, internal compounding, pneumocephalus, CSF leak, brain matter herniation, and surgical intervention, only GCS emerged as the independent risk factor associated with both 'survival with no CNS infection' and unfavorable neurological outcome (p<0.001). Surgical intervention had no significant benefit overall either on 'survival with no CNS infection', unfavorable neurological outcome or late posttraumatic seizures.

Conclusions

Surgical debridement appears to have no significant benefit over simple suturing in patients with compound skull fractures except possibly in the subgroup with brain matter leak.

Learning Objectives

To be able to: 1)Describe prognostic factors in patients with compound skull fractures, 2)Discuss evidence on managing these, 3)Comparatively evaluate surgical and conservative management in these patients

References

Bullock MR, Chesnut R, Ghajar J, et al. Surgical Management of Traumatic Brain Injury Author Group. Surgical management of depressed cranial fractures. Neurosurgery. 2006; 58(3 Suppl): S56-60