Postoperative Central Nervous System Infection (PCNSI) and Wound Infection After Neurosurgery in a Modernized, Resource-Limited Tertiary Neurosurgical Center in South Asia

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Introduction: Postoperative central nervous system infection (PCNSI) and wound infection are serious complications after neurosurgical intervention and can lead to increased financial burdens and poor patient outcomes. Moreover, there is a dearth of scientific literature examining the prevalence and impact of PCNSIs in modernized, resource-limited neurosurgical centers. This study examined the prevalence and causative pathogens of PCNSIs and wound infections at a resource-limited, neurosurgical center that serves an underprivileged patient population in South Asia.

Methods: This was a retrospective analysis of the medical records of all 363 neurosurgical cases operated between June 2012 and June 2013 of an updated, resource-limited neurosurgical center. Data from all operative neurosurgical cases during the twelve-month period were included in the study.

Data Analysis: The Wilconox rank sum was used to compare continuous variables: age, duration of surgery, and ESR. Fisher's exact test was used to compare categorical variables: gender, outcome, CSF leak, and surgery procdure. The above comparisons were made between the infected (n=71) and the not infected patients (n=292) and also separately between the patients with positive cultures (n=7) and the patients without postiive cultures (356).

Results: The results indicated 71 of the 363 surgical cases had abnormal CSF glucose or cellularity post-operatively and the summary statistics are provided on Table 1. These 71 cases were categorized as infected cases. Overall, 7 cases had positive CSF cultures. The PCNSIs with positive CSF cultures (9.86%) all had gram-negative bacteria with Pseudomonas aeruginosa (n=5), Escherichia coli (n=1), or Klebsiella (n=1). The data suggests a higher rate of death (p=0.031), a higher rate of CSF leak (p<0.001) and a higher rate of cranial procedures (p<0.001) among the infected patients. The data also suggests a higher rate of CSF leak among the patients with culture positive infections (p=0.038). Furthermore, there were 24 cases of wound infections of which 16 were culture-positive with Klebsiella (n=6), Pseudomonas (n=3), E. coli (n=3), Staph Aureus (n=3), and Proteus Vulgaris (n=1).

Conclusions: This study shows an increasing prevalence of gram-negative organisms in CSF cultures from PCNSIs. Given that these patients received broad antibiotic prophylaxis covering gram-negative and gram-positive organisms, the prevalence of gram-negative organisms found in PCNSIs and wound infections could indicate an increase in antibiotic resistant strains. Decreasing PCNSIs, especially those due to antibiotic resistant gram-negative organisms, can help decrease costs, improve outcomes, and allow better resource allocation in resource-limited neurosurgical settings.

Table 1. Summary statistics

Variables		Infected n(%)	Not Infected n(%)	P value
Sex				
	F	36(50.70)	112(38.36)	0.061
	M	35(49.30)	180(61.64)	
Outcome				
	Died	11(15.49)	20 (6.85)	0.031
	Discharged	60(84.51)	272(93.15)	
CSF Leak				
	Yes	14(19.72)	3(1.03)	<0.001
	No	57(80.28)	289(98.97)	
Procedure				
	C	63(92.65)	211(72.76)	<0.001
	S	5(7.35)	79(27.24)	
		Median (range)	Median (range)	
Age (yrs)		n=71	n=292	
		38(9-76)	46.5(0.05-84)	0.025
Duration of Surgery (hours)		n=51	n=243	
		4.25(0.25-9)	4.5(0.5-9.75)	1.000
ESR (mm/60min)		n=56	n=235	
		19(5-113)	19(2-76)	0.769