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INTRACRANIAL INFECTION RATE;
POST OPERATIVE PREVALENCE AT CIVIL HOSPITAL KARACHI, PAKISTAN.

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ABSTRACT… Objectives: The aim of our study is to determine the prevalence of post operative intracranial infection rate, at Civil Hospital Karachi, Pakistan. **Study Design:** Retrospective analysis of cases of craniotomy, studying the files of patients who had the procedure done. **Setting:** Neurosurgical Department at Civil Hospital Karachi Pakistan. **Period:** Ten years period (2005 to 2015). **Method:** To determine the incidence and factors associated with infection a sub group analysis was done in all those patients in whom the intracranial infection was caused by a cranial surgery. Patients who were administered antibiotics for the treatment of infection were not included also those who were treated for wound infection without intracranial involvement. Data was analyzed using SPSS version 20. **Results:** A total of 5800 cranial surgical procedures were performed by a team of 30 neurosurgeons and residents. And a total n= 116 (2%) procedures were done due to post operative infection on a total of n= 70 patients. N= 37 patients were male and n= 33 patients were female, the median age of patients was 50 years and the age range was from 2 to 75 years. The procedures were performed as elective procedures in n= 56 (80%) patients and as an emergency case in n= 14 (20%) patients. The most common organism was methicillin sensitive staphylococcus aureus, and the most surgeries who were found to have a high incidence of post operative infection for craniotomies done for removal of a tumor. **Conclusion:** The postoperative infection is one of the most important complications of cranial surgical procedures and required immediate attention and treatment, even after taking all the precautionary measures to ensure sterility a small number of patients still develop severe infection needing reoperation for removal of debris and pus.

Key words: Post operative infection, intra cranial infection, subdural empyema.

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INTRODUCTION

One of the serious complications of intracranial surgery is infection, and it requires immediate intervention, it presents as meningitis, sub dural empyema or cerebral abscess.[6,9,14,17,21]

Meningitis commonly occurs after surgical procedures which have an approach from the posterior fossa and is frequently found to be associated with a CSF leak, it is diagnosed via lumbar puncture and subsequent CSF analysis and treated with a vigorous course of antibiotics and steroids.[3,13,16] Other cases of infection such as subdural empyema, abscess and flap infection required operation with removal of the offending agent.[6,9,11,12,14,21] The surgical procedure then done is to remove the debris and allow the antibiotics to work effectively and efficiently. In a large series of procedures the rate of infection after prophylactic antibiotics was found to be 0.8 to 7%.[1,5,9,15,19] Some studies suggest an even higher rate of infection greater than 10%.[4,5,10,18,20,22,23,24] These included cases of both surgical and medical causes and also cases which were not operated, we underwent the review in our centre of the last ten years, and focused more on the infections that were observed after surgical procedures, excluding those that underwent simple wound revision and evacuation of pus.

MATERIALS AND METHODS

The type of study is a retrospective analysis of cases of craniotomy, studying the files of patients who had the procedure done at the department over the last ten years period (2005 to 2015) at Civil Hospital Karachi Pakistan. To determine the

incidence and factors associated with infection a sub group analysis was done in all those patients in whom the intracranial infection was caused by a cranial surgery. The incidence, associated factors and infectious organism was also noted. Patients who were administered antibiotics for the treatment of infection (without any surgical intervention, as in cases of meningitis and cellulitis) were not included also those who were treated for wound infection without intracranial involvement. Cases of patients having cerebral abscess, subdural abscess, epidural abscess, infection of the bone flap were included. The patients included in the study came to the department for surgical procedures either as emergency or elective cases, patients who had a prior surgical procedure done at some other institute were excluded from the study. Prophylactic antibiotic was administered to all the patients as 1gm of third generation cephalosporin one hour before the incision, and was followed in most cases by a one day course of postoperative antibiotics, but some cases were those whom did not receive post operative antibiotics. After shaving the site of incision, the area was scrubbed with pyodine solution, and the required procedure was performed. Data was analyzed using SPSS version 20, chi square test was used to analyze the difference between the groups and non parametric Mann Whitney U test was utilized where one of the groups contained continuous variable data.

RESULTS

In the period of study that is from the year 2005 to 2015 a total of 5800 cranial surgical procedures were performed by a team of 30 neurosurgeons and residents. And a total n= 116 (2%) procedures were done due to post operative infection on a total of n= 70 patients. N= 37 patients were male and n= 33 patients were female, the median age of patients was 50 years and the age range was from 2 to 75 years. The procedures were performed as elective procedures in n= 56 (80%) patients and as an emergency case in n= 14 (20%) patients. The most common complaint in the patient group was a change in mental status which was reported in n= 25 (35.71%) of patients. Other presenting complaints are listed in Table-I.

The majority of patients had more than 1 type of infection, and the most common type of infection found in the patient group was an epidural empyema found in n= 38 (54.28%) patients, the other types of infections were found as subdural empyema in n= 10 (14.28%) patients, cerebral abscess and abscess of the posterior fossa in n= 11 (15.71%) and n= 3 (4.28%) patients, wound infection was found in n= 36 (51.42%) patients and n= 31 (44.28%) patients had an infected bone flap all of these infections required redoing of the surgery, and significant association was not found between bone flap removal and the need for multiple procedures for the purposes of curbing the infectious agent a p value of less than 0.318 was obtained via a chi square test. The mean number of operations that were performed was 1.65 (median= 1, and a range between 1 and 5) n= 40 (57.14%) of patients had only one surgical procedure done to remove the infectious debris, while n= 13 (18.57%) had two procedures, and n= 7 (10%) had three surgical procedures done for successful treatment. In n= 2 (2.85%) patients 4 procedures had to be done. The most common organism that was found to be the cause of infection was methicillin sensitive Staphylococcus aureus, refer to Table-I. No significant association was found between the type of organism and the number of surgical interventions needed the p value for a negative culture was found to be less than 0.168, and p value for multiple infectious agents was found to be less than 0.091 and the p value for staphylococcus spp was found to be less than 0.548, according to the chi square tests done. The surgical procedure which had highest infection rate was craniotomy as done for tumor or mass lesion seen in n= 32 (45.71%) patients, for rest of the frequencies refer to Table-II. The duration for craniotomy and presentation with infection was at a median of 1.5 months with a range of 4 days to 1 year duration. For n= 37 (52.85%) of patients they presented with infection after their first operation and for n= 20 (28.57%) of patients presented with infection after their second procedure. And for n=13 (18.57%) had more than two procedures done before development of infection.

Infection	Number of patients
Subdural empyema	10 (14.28%)
Epidural Empyema	38 (54.28%)
Cerebral abscess	11 (15.71%)
Abscess of the posterior fossa	3 (4.28%)
Infection of the bone flap	31 (44.28%)
Wound infection	36 (51.42%)
Symptoms present	
Purulent discharge	24 (34.28%)
Change in the mental status	25 (35.71%)
Headache	14 (20%)
Swelling	10 (14.28%)
Fever	15 (21.42%)
Seizure	3 (4.28%)
Type of Organism	
Staphylococcus spp.	
Methicillin resistant	3 (4.28%)
Methicillin sensitive	14 (20%)
Coagulase-negative	8 (11.42%)
Steptococcus spp	3 (4.28%)
Propionibactrium spp	3 (4.28%)
Multiple organisms	7 (10%)
Enterobacter	4 (5.71%)
Pseudomonas	6 (8.57%)
Serratia	3 (4.28%)
Other	8 (11.42%)
Candida spp	3 (4.28%)
Culture negative	8 (11.42%)

Table-I. Type of infection in patients and the most common infectious agents.

DISCUSSION

In a large series of neurosurgical procedures the incidence of infections was found to be from 0.8 to 7% (despite prophylactic antibiotics, and including non operative cases).[1,5,9,15,19] In our study we reviewed our experience at our department which is one of the highest volume centre in Karachi Pakistan. We conducted a retrospective review in order to find out the rate of infection that required surgical intervention, and only focused on patients who required reoperation for removal of debris or pus evacuation. We found a total of n= 70 (total number of procedures= 116) patients out of the n= 5800 patients that were operated upon in the ten year period, for an incidence of 2%, which is lower than some other series that report greater than 1000 procedures. According to McClelland and Hall they report the postoperative incidence of infection to be 0.63% in a total of 1587 elective procedures, which an incidence rate similar to our study. 35% of their cases of infection were associated with indwelling catheters, where as this was much lower in our study. In our study the most common organism was staph aureus spp which occurred in 35.71% of cases, which is similar to other studies which report S. aureus in upto 50% of cases.[2,7,8,9,20] In a study by Korinek et al, he studies a series of 2944 patients who had craniotomy done, and there were 3% (n= 87) occurrences of post operative infection, excluding n= 56 meningitis, and n= 30 cases of wound infection.[7] The risk factors he identified for infection were leakage of CSF, and subsequent surgical procedures. Other risk factors included, emergency procedures, clean contaminated or dirty wounds, an operative time of greater than 4 hours duration, while prophylactic antibiotic was not a determining factor for infection.[7] But in our study we were not able to find a statistically significant increase in infection for emergency versus elective case. The

Type of procedure	Emergency procedure	Elective procedure	Total
Craniotomy (tumor)	0 (0%)	32 (45.71%)	32 (45.71%)
Craniotomy (hemorrhage)	1 (1.42%)	1 (1.42%)	2 (2.85%)
Craniotomy (vascular lesion)	0 (0%)	10 (14.28%)	10 (14.28%)
Craniectomy (decompression)	0 (0%)	2 (2.85%)	2 (2.85%)
Infratentorial craniectomy	1 (1.42%)	1 (1.42%)	2 (2.85%)
Surgery for seizures	0 (0%)	1 (1.42%)	1 (1.42%)
Trauma management			
Craniotomy (hemorrhage)	8 (11.42%)	1 (1.42%)	9 (12.85%)
Craniectomy (decompression)	4 (5.71%)	0 (0%)	4 (5.71%)
Other	0 (0%)	8 (11.42%)	8 (11.42%)

Table-II. Types of surgical procedures.

retrospective case series analysis reflects the rarity of the infection, and it helps in defining its natural history and progression. We did not find any statistical significance when it come to the type of organism and number of surgical procedures done, which may be due to the small number of patients in the series. One of the cofounding factor is the multiple number of surgeons who were involved in the procedures, we did not compare the time duration of the procedure to the incidence of infection, but previous studies have shown that there exists a correlation.[7] It is quite possible that many patients were not included because they had gone to some other facility for treatment of infection. A total of n=31 (44.28%) patients had bone flap removal at surgery for the infection, which was due to the observation that the bone flap was not infected, that is in a case of deep abscess, there is no statistically significant association found between bone flap removal and infection occurring again, having a p value of less than 0.318.

CONCLUSION

The postoperative infection is one of the most important complication of cranial surgical procedures and required immediate attention and treatment, even after taking all the precautionary measures to ensure sterility a small number of patients still develop severe infection needing reoperation for removal of debris and pus.

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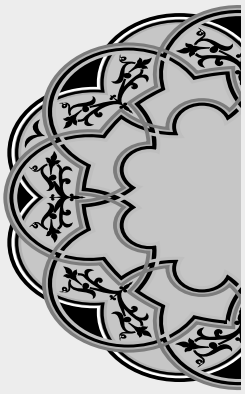

"Health is not valued till sickness comes."

Thomas Fuller

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