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Frequency of traumatic cerebrospinal fluid rhinorrhoea in mild head injury with pneumo-encephalus

Aurangzeb Kalhoro, Abdul Samad, Lal Rehman

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Mother and Child health center, Pakistan Institute of Medical Sciences, Islamabad
A Batool
M Zafar

Allama Iqbal Memorial Hospital, Silakot
S Sarwar

Eye Donors Organization, Wah Cantt
I Anwar

Correspondence:
Dr. Aurangzeb Kalhoro,
Consultant Neurosurgeon
KGH hospital & KMH Hospital, Karachi
Cell: + 92-332-2679361
Email: aurangzeb_k1@yahoo.com

Abstract

Objective:Cerebrospinal fluid rhinorrhea is a condition that occurs during head injury which might be lethal if not treated accordingly. Therefore this study was performed to determine frequency of traumatic CSF rhinorrhea in mild head injury (GCS 13-15) with skull base fracture diagnosed by CT Scan brain plain.

Duration: 17 April 2017 to 16 March 2018

Study design : Observational study

Setting: Jinnah post graduate mrdical centre

Methodology: A prospective observational study conducted on 97 patients for a period of around 1 year from 17th April 2017 till 16th March 2018 with non-probability convenient sampling technique in the Department of Neurosurgery at the Jinnah Post-graduation Medical Centre Karachi after taking ethical approval. Patients of either gender presenting with mild head injury having a history of fall, road traffic accident or assault between the ages of 16 to 65 years, with a GCS between13-15 were included in this study. Patients with a GCS <13 and with a history of spontaneous CSF rhinorrhoea, skull base surgery, brain space occupying lesion like tumours, tuberculoma or abscess were excluded from this study. The demographic variables were documented. Demographic variables such as age and gender were recorded. Data was analysed using SPSS version 16.0. Chi-square test was applied to assess the association. Significance of P value was set at being ≤0.05.

Results: The mean ages of the patients were 40.42 ± 7.47 years. Out of 97 patients, 59(60.8%) were males and 38(39.2%) were females. Traumatic CSF rhinorrhoea in patients of mild head injury having GCS 13 was 74.1% (20/27), with GCS 14 was 39.4% (15/38) and with GCS-15 was 68.8% (22/32) patients. From the 59(60.8%) males, 40(68%) of them were diagnosed with CSF rhinorrhoea while 19(32%) were not.Significant difference was observed among GCS groups (p-value=0.008). Traumatic CSF rhinorrhoea in mild head injury with skull base fracture diagnosed by plain CT-Scan of brain reported that 61 (63%) of the patients had CSF rhinorrhoea.

Conclusion:The results of the present study predicted a high proportion of CSF leakage in patients with mild head injury. Furthermore, significant association was observed in age and glassgow comma scale with cerebrospinal fluid rhinorrhea.

Keywords: Traumatic, CSF leakage

Introduction:

Cerebrospinal fluid (CSF) rhinorrhoea is a clinical illness resulting through an acquired communication between the brain and peripheral nervous system.[1] CSF rhinorrhoea is a grave and possibly fatal disorder that represents a major obstacle in terms of its diagnosis and management.[2] It is projected that meningitis ensues in approximately 10%–25% of patients of CSF rhinorrhoea, and 10% of them expire as a result. Around 80% of all CSF rhinorrhoea cases are due to skull injuries which are linked with cra-

nial fractures.[3] Predictable incidence of basilar skull fracture in non-penetrating head trauma fluctuates between 7% and 16% for all skull fractures, with a related CSF leakage occurring in about 10%–30% of these patients.[4] Leakage of CSF can ensue anywhere if the dura mater is lacerated during injury forming a pathway in-between intracranial and nasal cavities. CSF rhinorrhoea may present instinctively or succeeding trauma and if untreated might progress to ascending meningitis and other complications.[5] Managing it frequently requires the cooperative care from many clinicians. Even if CSF rhinorrhoea has been traditionally treated using open surgical procedures, the introduction of the rigid endoscope for minimally invasive endonasal procedures has revolutionized treatment for many patients.[6] In spite of various advances, it is still difficult to critically understand the texts with regards to ideal management of CSF leakage after craniomaxillofacial trauma. Some published articles, though recording the efficacy of endoscopic surgery to repair CSF leaks, have failed to differentiate patients into separate etiological groups when documenting the results.[7] Patho-physiological traumatic cranio-dural fistula allows CSF to escape through para nasal sinuses into nasal cavities with air entrance, result in pneumoencephalus by a valve mechanism of dural defect. Thus leakage of fluid permeates ascending infection while air at body temperature expands into white matter to produce its toxic effect.[8,9] There are accurate and non-invasive biochemical methods as glucose, beta-trace-protein and beta-2-transferrin in secretion and imaging techniques as computed tomography scan (CT Scan) brain plain to detect any skull base defect and Magnetic Resonance Imaging (MRI) brain plain in prone position for localization of dural defect.[10] Management of CSF leaks include conservative like a closed lumbar drainage system (CLDS) as well as surgical closure of defects at the skull base to prevent ascending meningitis, even in childhood age group.[11-13] After a CSF fistula has been identified, management is dictated by the cause of the leak, its location, and its flow volume. High-flow CSF leaks rarely close spontaneously and often require surgical intervention. For low-volume leaks, conservative measures may be employed. Spontaneous leaks with low or intermittent volume may be managed conservatively with bed rest, head elevation, avoidance of straining activities, and temporary CSF diversion with a lumbar drain.[14] Because the majority of CSF leaks caused by closed head injuries resolve spontaneously, trauma patients may be conservatively managed unless they experience neurologic deterioration or are diagnosed with additional intracranial pathology.[15]

The issues related to CSF leak caused by traumatic injury are complex and multiple. Having conducted a thorough review of existing literature, we discuss here the pathophysiology, diagnosis, and management of CSF rhinorrhoea relevant to traumatic anterior skull base injuries and attempt to identify areas in which further research is needed.

Material and methods:

A prospective observational study conducted for a period of 11 months from 17th April 2017 till 16 March 2018 in which patients were selected through non-probability convenient sampling technique. The study comprised of a total of 97 patients from the Department of Neurosurgery at the Jinnah Post-graduation Medical Centre Karachi. Ethical approval was pursued from institutional review board Jinnah post-graduation Medical Centre Karachi.

Patients of either gender presenting with mild head injury having a history of fall, road traffic accident or assault between the ages of 16 to 65 years, with a GCS between13-15 were included in this study. Patients with a GCS <13 and with a history of spontaneous CSF rhinorrhoea, skull base surgery, brain space occupying lesion like tumours, tuberculoma or abscess were excluded from this study.

Data collection process was done after taking informed consent. The demographic variables were documented. Demographic variables such as age and gender were recorded. Dependant variables included GCS and CSF rhinorrhoea. Data was analysed using SPSS version 16.0.

Data was presented as descriptive analysis and presented. Frequency and percentage were computed for qualitative variables like gender, mode of trauma and CSF rhinorrhoea. Age was presented as mean and standard deviation. Stratification was done to control effect modification like age, gender and GCS to observe CSF rhinorrhoea in skull base fracture. Effect modifiers like age and gender were controlled by stratification. Chi-square test was applied to assess the effect of confounding variables on outcome variables. Significance of P value was set at being ≤0.05.

Results:

Among the total of 97 patients with mild head injury with a GCS in-between 13-15,most of them, 58 (60%) were between 31 to 50 years of age. The mean ages of the patients were 40.42±7.47 years. Out of 97 patients, 59(60.8%) were males and 38(39.2%) were females. Grouping of age was done into 6 groups (from 16-20, 21-30, 31-40, 41-50, 51-60 and 61-65 years of ages). Frequency of patients in 16-20 group was 8(8.3%), in 21-30 was 11 (11.3%), 31-40 was 35 (36.1%), in 41-50 was 23 (23.7%), in 51-60 was 15 (15.5%) and in 61-65 was 5 (5.2%). GCS was recorded as 13, 14 and 15 with 27 (27.8%), 38 (39.2%), 32 (33%) patients respectively. Majority of patients had a history of road traffic accident 53 (54.6%) while 32 (33%) had a history of fall and 12 (12.4%) had a history of assault. (table1) Traumatic CSF rhinorrhoea in patients of mild head injury having GCS 13 was 74.1% (20/27), with GCS 14 was 39.4% (15/38) and with GCS-15 was 68.8% (22/32) patients. From the 59(60.8%) males, 40(68%) of them were diagnosed with CSF rhinorrhoea while 19(32%) were not.Significant difference was observed among GCS groups (p-value=0.008). Among 38 females, 21(55%) of them had CSF rhinorrhoea whereas 17 (45%) weren't diagnosed with CSF rhinorrhoea. P-value was found to be non-significant, i.e. 0.212. In 16-20 age group, 2 (25%) out of 8 had CSF rhinorrhoea, 21-30 age group had 5 (45%) out of 11 who were diagnosed with CSF rhinorrhoea, 31-40 age group had 28 (80%) from 35 having CSF rhinorrhoea, 51-60 age group had 8 (53%) out of 15 with CSF rhinorrhoea and 61-65 age group included 3 (60%) who had CSF rhinorrhoea. P-value was reported to be significant, i.e. 0.044. (table-2). Traumatic CSF rhinorrhoea in mild head injury with skull base fracture diagnosed by plain CT-Scan of brain reported that 61 (63%) of the patients had positive findings while 36 (37%) patients scan was negative for CSF rhinorrhoea(figure-1)

Discussion:

In our study there was significant difference in patients of traumatic CSF rhinorrhoea having mild head injury. In a study by Friedman et al on 101 patients with posttraumatic CSF leaks in which CSF leaks occurred 26 (60%) out of the 43 patients with clinically evidenced leaks.[16] This finding is in accordance to our study in which the frequency of traumatic CSF rhinorrhoea in post-traumatic patients was 61 (63%). Choi et al retrospectively reviewed 293 patients with posttraumatic skull base fractures, and a CSF leak was diagnosed in 115 patients.[17] This above results are similar to our study in which the frequency of post-traumatic CSF rhinorrhoea patients was 61 (63%). Meningitis is the most frequent complication of post-traumatic CSF rhinorrhea. Although 11%– 38% of patients with CSF rhinorrhea become infected, the use of prophylactic antibiotics continues to be a controversial issue. The incidence of meningitis after posttraumatic CSF rhinorrhea is higher in the first few weeks and the cumulative risk increases with persistence of the leak. (18-20) A couple of studies have reported that CSF leaks following skull base fractures develop in approximately 10%–30% of patients.[21,22] This is in contrast to our study where we found 63% of post-traumatic patients to have CSF leakage. Majority of the patients in our study having GCS of 13 had the highest percentage of CSF rhinorrhoea (74.1%) which shows the lesser the GCS; greater are the chances for having CSF rhinorrhoea. The above finding was confirmed through a significant p-value of 0.008 with regards to CSF rhinorrhoea and GCS. Similarly, p-value between age groups and GCS was also reported to be significant, i.e. 0.044 which im-

plied that age is an important parameter in terms of head injuries leading to CSF rhinorrhoea. However the p-value between gender and CSF rhinorrhoea was not significant (0.212) which indicated that gender did not play a significant part with regards to having CSF rhinorrhoea after mild head injury. 53 (55%) of patients had a history of road traffic accident whereas 32(33%) previously had fall and 12 (12%) had history of assault.

Conclusion:

The results of the present study predicted a high proportion of CSF leakage in patients with mild head injury. Furthermore, significant association was observed in age and glassgow comma scale with cerebrospinal fluid rhinorrhea.

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Role and contribution of authors:

Dr Aurangzeb Kalhoro, conceived the idea, collected the data and references and did the initial writeup.

Dr Abdul Samad, collected the references and helped in introduction and discussion writing.

Dr LalRahman critically review the article and made the final changes.

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