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ORIGINAL ARTICLE

Intracranial Otogenic Complications in Adults: New Factors That Influence its Onset

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ABSTRACT

Aim: To investigate new factors which influence intracranial otogenic complications in adults.
Study Design: Retrospective study
Place and duration of study: Department of ENT, Services Hospital Lahore from 1st October 2021 to 31st March 2022.
Methodology: Fifty patients were analyzed in COVID times (2020-2021) with intracranial otogenic complications for determination of new factors for the onset of this disease complication. Hundred patients were assessed from the time period of 2014-2018. The diagnosis was confirmed on the basis of MRI or MRV imaging with intracranial complications. Reverse Transcriptase PCR was also performed on each patient through naso-pharyngeal swab test. The patients age, gender, clinical and comorbidity history, neurological state, immobility, prophylaxis and coagulopathy risks were documented.
Result: The mean age of the patients was 62.3±5.5 years during COVID times and 50.2±6.1 years before COVID-19. The Pre-COVID-19 period had all males reported with intracranial otogenic complications. While in COVID times 12% females were reported with intracranial otogenic complications such as meningitis, brain abscess as well as Lateral/venous sinus thrombosis. Lateral/venous sinus thrombosis among IOC was more commonly observed in the COVID time.
Conclusion: Cerebral lateral/venous-sinus thrombosis is appeared to be the rare factor that can be linked with COVID-19.
Keywords: Complications, Otitis media, COVID-19, Adult, Intracranial otitis

INTRODUCTION

COVID-19 has been presented as a wide manifesting disease with multi spectrum of symptoms. Otitis media has been one of the highlighted complications of a viral infection such as COVID-19 or is associated with rare presentations with conjunction and other symptoms.[1] COVID-19 had been observed for its damaging effects on middle and inner ear.[2-4] Cochlea has been mostly involved without presentation of general clinical symptoms.[3] Radiological proven labyrinthitis has also been presented sporadically[5].

Acute and chronic otitis media are considered to occur at random rates in any set of given population. There are some factors which have been reported to instigate the intracranial otogenic complications (IOC). These include limited medical resources, raised morbidity in a population as well as thromboembolic activity of COVID-19 which includes venous thromboembolism through the endothelial rupturing[6-8]. Sigmoid-sinuses and the transverse sinuses have been identified as the main sites of the cerebral venous-sinus thrombosis (CVST) which is related with the COVID-19. In some cases, multiple sinus spanning was also observed[9-13].

Most of the CVST cases have been reported in adults having comorbidities but research elaborated the presentation of this even in youngsters with complication and significant clinical history[14]. The present study was designed to detail the new associated factors in Pakistani population which results in the formation of the IOC specifically in the adults. This study will assist in finding the new causative agents who are left un-assessed and therefore not addressed timely.

MATERIALS AND METHODS

This cohort study designed as retrospectively was carried out at ENT Department Services Hospital Lahore. The study enrolled all the patients who were diagnosed with IOC after their complete clinical assessment and conformation. The study was approved by the ethical board and informed consent was taken from each participant or their attendants. Analysis of IOC cases reported within last five years was also made. Fifty patients were analyzed in COVID times (2020-2021) with IOC for determination of new factors for the onset of this disease complication while 100 patients were assessed before such as from (2014-2018). The IOC was termed as subacute/chronic otitis media having chronic ear discharge, exacerbation of acute symptoms such as otalgia, fever or headache. The diagnosis was confirmed on the basis of MRI or MRV imaging with intracranial complications. Intracranial complications involved meningitis, sigmoid sinus vein thrombosis, epidural or sub-epidural or brain abscess, internal jugular vein thrombosis. Reverse transcriptase PCR was also performed on each patient through naso-pharyngeal swab test. The patients age, gender, clinical and comorbidity history, neurological state, immobility, prophylaxis and coagulopathy risks were documented. No changes in population size or type were ensured for minimizing bias in the study. Routine laboratory details including antibody IgG test for COVID-19, complete blood count as well as D dimer, serum ferritin results were also analyzed. Data was analyzed using SPSS version 25.0 by using odds ratio and probability with a p value <0.05 as significant.

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RESULTS

The mean age of the patients was 62.3±5.5 years during COVID and 50.2±6.1 years of pre-COVID. The pre COVID 19 period had all males reported with IOC whereas in COID times 12% females were also reported with IOC (Table 1). The time cohort also presented that cardiovascular and pulmonary complications were significantly higher in the COVID times as compared with the pre-Covid period where as venous sinus thrombosis and coagulopathy risk was higher in pre-COVID time significantly from COVID duration. There was insignificant variance within chronic otitis history between both time cohorts with a probability as 1.1 (Table 2).

Meningitis, brain abscess as well as venous sinus thrombosis related with IOC was more commonly observed in the COVID time especially in a combination presentation in COVID patients which were confirmed through RT PCR and the probability was 0.009 (Fig. 1). The MRV imaging of IOC patients with COVID

19 positive results showed absence of flow in sigmoid sinus and right transverse in addition to jugular vein. The contrast imaging presented thrombus in the jugular vein as well as sigmoid sinus (Fig. 2). The radiological imaging through MRV also presented coronal reconstruction in contrast and thrombus formation in the left sigmoid sinus (Fig. 3).

Table 1: Incidence of intracranial otogenic complications in both genders

Variable	Time Cohort (n)		Odd Ratio (5% CI)	Probability
	Pre COVID (n=100)	COVID time (n=50)		
Gender				
Males	99 (99%)	44 (88%)	0.57 (0.02-15.1)	1.1
Females	1 (1%)	6 (12%)		
Age (year)	62.3±5.5	50.2±6.1	--	0.049

Table 2: Incidence of intracranial otogenic complications in time cohort

Variable	Time Cohort (n)		Odd Ratio (5% CI)	Probability
	Pre COVID (n=100)	COVID time (n=50)		
Venous sinus thrombosis	80 (80%)	22 (44%)	5 (0.39-64.37)	0.3
Cardiovascular	20 (20%)	27 (54%)	--	0.002
Pulmonary	20 (20%)	11 (22%)	--	
Chronic otitis history	60 (60%)	28 (56%)	1.2(0.14-11.06)	1.1
Coagulopathy risk	25 (25%)	7 (14%)	0.05(0.003-1.05)	0.067

Fig. 1: Comparison of meningitis, brain abscess and venous sinus thrombosis within COVID and pre COVID time having IOC

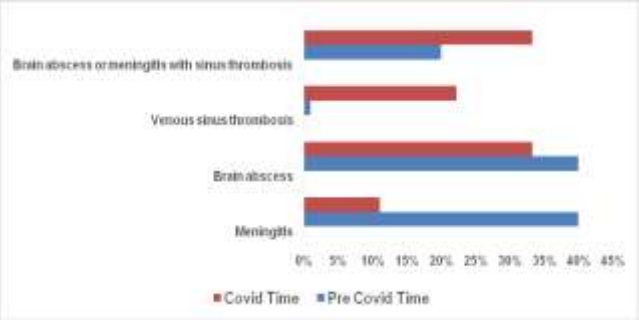


Figure 2: MRV imaging with absence of flow in sigmoid sinus, right transverseand jugular vein (a), contrast image showing thrombus in the jugular vein, sigmoid sinus (b)

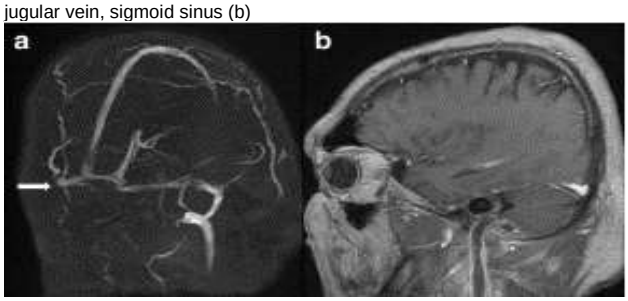
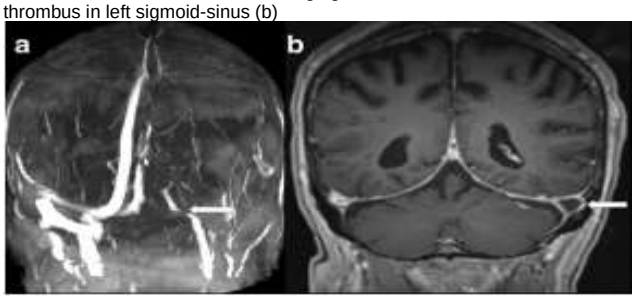


Fig. 3: MRV imaging with absence of flow in transverse and sigmoid sinus(a) and the T1- MPRANGE contrast imaging showed coronal reconstruction, thrombus in left sigmoid-sinus (b)



DISCUSSION

COVID-19 emerged to be as chaotic pandemic which cause widespread destruction all over the globe. It mainly affects the respiratory tract but also poses serious complications and become the root cause of comorbidities even with mild presentation of COVID symptoms. Along with various other complications, it also causes otitis media which is considered as the significant cause of intracranial otogenic complication. Number of studies has been conducted on adult population to find its underlying causes/factors and its related comorbidities. Its frequency also appeared to be higher in younger individual. However, limited data is available for youngsters especially from under developed countries like Pakistan. Present study was designed to find the new factors which cause intracranial otogenic complications in Pakistani population[15-18].

Otogenic infections appeared to be the significant cause of intracranial complications regardless of the use of antibiotics. Cholesteatoma reported to be the important cause of otogenic complications. Otitis media resulted into CVST and treatment plan were same in COVID and pre-COVID time. Patients were treated with antibiotics but these medications shifted to telemedicine. Studies showed that, these patients did not come in close contact with ENT specialist despite they prefer neurologist/ General practitioner. In COVID pandemic, most of the population was asymptomatic but later with chronic deficiencies and low immunity. Majority of CVST patients represents only with mild to moderate severity and symptoms with corona virus infection[19-21].

In present study participants, no history of COVID infection appeared. Nevertheless, it is believed that, these patients had mild COVID-19 infections in the past and display hyper-coagulate state. On the other hand, large number of patients were not taking medical treatment and neglecting their symptoms which further provoke the lethal complications. Intracranial otogenic complications in present study highlights that it enhances many times cardiovascular comorbidities in patients after COVID infections.

CONCLUSION

Cerebral venous-sinus thrombosisis appeared to be the rare factor that can be linked with COVID-19. However, literature represents it as a frequent cause of CVST in both acute and chronic otitis media patients.

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