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Incidence and Bacteriology of Acute Suppurative Parotitis in Patients Managed by Non Invasive Ventilation.

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Abstract:

Background: acute parotitis is possible proposed sequel of Noninvasive ventilation due to the effect of intraoral positive pressure with subsequent jeopardy of the salivary flow from the Stensen duct. However the process is thought to be mutifactorial , compression of the external parotid duct by the oronasal mask, advanced age, dehydration, and oral intake restriction, all are involved in the ensuing salivary stasis. **Methods:** 675 patients diagnose as COVID 19 based upon polymerase chain reaction who were admitted to the intensive care units for acute sever COVID 19 associated respiratory failure in whom non invasive ventilation was the selected intervention. suspected cases of parotid suppuration were subjected for Fine needle aspiration and pus or seropurulent fluid were obtained which is subjected to aerobic and anaerobic cultures. **Results:**Eleven patients developed an Acute suppurativeparotitis 1.63%. CPAP was more commonly used method for non invasive ventilation than BiPAP (54.66 % VS45.34). Parotitis was significantly more prevalent in patients treated with CPAP than BiPAP. Parotitis was more prevalent in patient using non invasive ventilation more than 10 days. **Conclusion:**The recent increase in the use of non invasive ventilation in the management of COVID 19 pandemic, the incidence of suppurativeparotitisparotitis has increased which directly related to the time of non invasive ventilation.

Key words:**Acute parotitis ,non invasive ventilation.**

Introduction:

The parotid gland is the largest major salivary gland , its secretion is delivered to the mouth through the Stensen duct which opened at the buccal mucosa opposite to the 2nd upper molar tooth.(1) Certain factors that interfere with salivary flow such as sialolithiasis, stasis , dehydration, mass , duct anomalies and certain medications like anticholinergic drugs. (2)

Noninvasive ventilation (NIV) is a common used modality in critical care unites for the management of patients with acute respiratory failure.(3)Noninvasive ventilation technics are

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continuous positive airway pressure (CPAP) , bilevel positive airway pressure (BiPAP) and oxygen via high-flow nasal cannula (HFNC). (4,5)

acute parotitis is possible proposed sequel of Noninvasive ventilation due to the effect of intraoral positive pressure with subsequent jeopardy of the salivary flow from the Stensenduct.(6)However the process is thought to be mutifactorial , compression of the external parotid duct by the oronasal mask, advanced age, dehydration, and oral intake restriction, all are involved in the ensuing salivary stasis.(6,7,8,9)

Acute parotitis is relatively uncommon condition with incidence of 0.01 to 0.02% of hospital admissions and 0.002 to 0.04% of postoperative patients. (10)Staph aureus considered as the most common , Strep viridans, E. coli, and anaerobic oral flora are also reported pathogens in the aetiology of parotitis.(11)The bacterial trapping in poorly drained saliva in the stensen duct and subsequent proliferation results in acute suppurativeparotitis.(12)

Clinically patients presents with painful parotid enlargement , the pain become worse with eating. The affected gland become swollen , tender, warm, and the overlying skin become red. With gentle pressure over the gland pus can sometimes be expressed through the stensen duct.(13)

In the recent COVID 19 pandemic large number of patients developed severe hypoxaemic respiratory failure requiring ventilatory support, and in some countries the intensive and respiratory unites become overwhelmed. Data from published series suggest that non invasive ventilatory support was common used protocol in COVID 19 induced respiratory failure.(14,15,16,17). In one series they reported that 17.6%of patients required ventilatory support.(18)

Methods :

During the period from June 2020 to march 2021 , 675 patients diagnose as COVID 19 based upon polymerase chain reaction who were admitted to the intensive care units for acute sever COVID 19 associated respiratory failure in whom non invasive ventilation was the selected intervention. All patients were assessed for the development of acute suppurativeparotitis based upon manifestations of pain in the parotid region , painful mastication, parotid swelling, and pus expression from the parotid duct. All suspected cases of parotid suppuration were subjected for Fine needle aspiration and pus or seropurulent fluid were obtained which is subjected to aerobic and anaerobic cultures. Detailed information was obtained regarding participants, age , gender, , presence of co morbidities (diabetes mellitus, cancer, immunosuppression), type and time of non invasive ventilation. Data were analyzed using SPSS software system version 22 . Fisher's exact test. was used for categorical variables and P value $\leq 0,05$ considered significant.

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Results :

Among 675 patients with respiratory distress as a complication of COVID19 infection managed by continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP). Mean age of patients was 56 years (30-86 years) , with male to female ratio 1.59 Eleven patients developed an Acute suppurativeparotitis 1.63%.

Table 1 Type of non invasive ventilation

Parotitis	CPAP		BiPAP	
	No.	%	No.	%
Positive	9	2.43	2	0.65
Negative	360	97.57	304	99.35
Total	369	54.66	306	45.34

P value 0.03

CPAP was more commonly used method for non invasive ventilation than BiPAP (54.66 % VS45.34). Parotitis was significantly more prevalent in patients treated with CPAP than BiPAP.

Table 2 Time of invasive ventilation

Parotitis	2-5 days	5- 10 days	More than 10 days
Positive	0	2	9
Negative	99	239	326
Total	99	241	335

P value 0.01

Parotitis was more prevalent in patient using non invasive ventilation more than 10 days.

Table 3 Presence of co morbidity

Parotitis	Diabetes	Cancer	Immunosupression
Positive	3	0	1
Negative	49	1	2
Total	52	1	3

P value 0.09

Among 52 diabetic patients in whom non invasive ventilation was used , 3 patients developed parotitis , although not statistically significant , diabetes appeared as a possible risk factor

Table 4 bacterial culture

Growth characteristics	Type of organism	No	%
Aerobic growth	Staph. aureus	4	36.36
	Strepto. pyogenes	1	9.09
	E.coli	1	9.09
Mixed growth	Staph. aureus + Anaerobic cocci	3	27.27
Anaerobic growth	Peptostreptococcusspp	1	9.09

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	Fusobacteriumspp	1	9.09
	Grand total	11	100%

Staph. Aureus was the commonest isolated pathogen as a sole microorganism (36.3%) or as mixed infection with anaerobic cocci(27.27%) followed by other bacteria.

Discussion:

Until December 2019, the use of non invasive ventilation was limited to specific indications, obstructive sleep apnea, congestive heart failure, chronic obstructive air way disease. Earlier in the COVID 19 outbreak in China management of severe cases of COVID associated respiratory distress was largely dependent upon early endotrachialintubation.(19)

The world wide spread of COVID 19 started at March 2020 and responsible for the ongoing pandemic , after that the treatment of severe cases which has been adopted in the early reports has changed, mainly due to limited availability of ventilators, and the associated high mortality with this approach, the change was toward the use of non invasive ventilation to cope with increasing number of patients requiring respiratory support as adjunct but not a substitute for invasive ventilation .(20) Subsequently CPAP and BiPAP was the most widely used ventilation support in the intensive care unit worldwide.(21)

The association of acute suppurativeparotitis and non invasive ventilation has been documented by few case reports .(8, 22) In the present series we reported 11 case of acute parotitis among 675 patients (1.63%) managed by non invasive ventilation , this incidence was found higher than the previous report of parotitis in critically ill patients.(10) The possible reason is the incredibly increasing number of patients managed by non invasive ventilation during the recent COVID 19 pandemic.

The most acceptable explanation for this association is generation of high intraoral pressure and mechanical elements of face mask application , with subsequent salivary duct obstruction and sialostasis. In addition most patients who require non invasive ventilation are critically ill and this may prohibits normal oral nutritional intake with the subsequent dehydration, and poor stimulus to the normal salivary flow, all these factors in conjunction can lead to the higher risk of development of acute suppurativeparotitis.(6)

Based upon our results Parotitis was significantly more prevalent in patients treated with CPAP than BiPAP, this may be attributed to the mechanics of the used method of ventilation. In addition there was significant direct association between development of protitis and the time of non invasive ventilation. No significant statistical association was found between diabetes and non invasive ventilation , however larger sample size may declare this association. Similar to results of previous series we found that Staphylococcus aureus and anaerobic bacteria.(23)

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Conclusion: With the recent increase in the use of non invasive ventilation in the management of COVID 19 pandemic, patients should be regularly checked for the development of suppurativeparotitis,then a specific treatment can be initiated earlier in the course of the disease. The incidence of parotitis found to be directly proportional to the period of ventilation Proper oral hygiene and dietary management in patients managed by non invasive ventilation might minimizes the risk.

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