PREVALENCE OF ODONTOGENIC FACIAL SPACE INFECTION AT HAYATABAD MEDICAL COMPLEX PESHAWAR, PAKISTAN: A FIVE YEAR STUDY

Fahim ud Din[1], Muhammad Mushtaq[1], Khadim Shah[1], Yasir Rehman Khattak[1], Nadia Ashraf[1], Muhammad Aamir[2]

ABSTRACT

Objective: The aim of this study was to determine the frequency of odontogenic fascial space infection in patients reporting to Hayatabad Medical Complex Peshawar and to found out the risk factors and to take possible measures for the prevention of this debilitating disease process.

Material and methods: A retrospective analysis of the data recovered from the admission charts of the admitted patients was carried out from January 2013 to December 2018. A prior approval of the hospital ethical committee had been taken. Data was collected for age, gender, tooth/teeth involved, involvement of the fascial space, any systemic illness concomitantly with odontogenic fascial space infection, need for intensive care unit, surgical airway (tracheostomy) and mortality rate.

Results: A total of 202 patients presented with Odontogenic fascial space infection out of 1715 patients. Among them, 123 (60.89%) were males and 79 (39.11%) were females. The mean age was 31.37. Mandibular teeth were most commonly involved with a frequency of 64.36% and maxillary teeth with frequency of 35.64%. Mandibular first molar was found to be the most frequent tooth with frequency of 41.08%. Submandibular space was found to be the most frequent finding with a frequency of 25.24%. Three patients (1.48%) needed surgical airway (tracheostmy) while three patients (1.48%) needed surgical ICU care. Among these patients 103 (50.99%) were diabetic while both diabetic and cardiovascular diseases comprised of 26 (12.87%) patients each and pregnant females were found to be 20 (9.9%).

Conclusion: The mandibular teeth were most commonly involved and Submandibular space was the most common site. Uncontrolled diabetes was most common disease found concomitantly with odontogenic fascial space infection.

Key words: Odontogenic, Fascial space, Odontogenic infection.

INTRODUCTION

An odontogenic infection arises within a tooth or in the nearby surrounding tissues.1 The term is derived from odonto- (from ancient Greek odous - «tooth») and -genic (from Greek genos - «birth»).[1] About 90-95% of all orofacial infections arise from the teeth or their supporting structures.[2] Fascial spaces are potential spaces that exist between the fasciae and underlying organs and other tissues.[3] These spaces do not exist normally; Release of bacterial enzymes (e.g. hyaluronidase and collagenase) may facilitate opening of the fascial spaces which cause tissue lysis .[4,5] Generally, the spread of infection is determined by barriers such as muscle, bone and fasciae. Pus usually spreads through path of least resistance.[6] Based on the point at which the infection erodes through the alveolar bone and surrounding muscles attachment, infections arising from any maxillary or mandibular tooth can cuase vestibular, buccal, or subcutaneous space infection. Infections arising from the maxillary teeth also tend to spread into the infraorbital, palatal, orbital, and infratemoporal spaes, and the maxillary sinus. Mandibular dental infections also tend to spread into the submandibualr , sublingual, submental and masticator spaces. Infections can extend beyond these primary spaces into the deeper fascial spaces of the neck, such as the lateral pharyngeal, retropharyngeal, carotid, and pretracheal spaces. From there, such infections can spread into the danger space and mediastinum. In addition, infections can rise superiorly through the sinuses or vascular structures to invade the brain or intracranial dural sinuses, such as the cavernous sinus.[7]

Patients mostly in young age group with odontogenic fascial space infection with male to female ratio of 1.3:1 were recorded in a study conducted by Cachovan.[8] Mandibular third molars had been identified as the most common cause of maxillofacial infections.[9]

Pterygomandibular and submandibular spaces are commonly involved due to spread of odontogenic infection from mandibular teeth.[10] Cardiovascular diseases were reported in 17.2% cases while Diabetes Mellitus was noticed in 4.4% cases concomitantly with

1 Department of Oral and Maxillofacial Surgery, Hayatabad Medical Complex, Peshawar.
2 Department of Oral and Maxillofacial Surgery, Bacha Khan Medical Complex Swabi

Address for correspondence:
Dr. Fahim ud din
Department of Oral and Maxillofacial Surgery, Hayatabad Medical Complex, Peshawar.
Contact: 00923219693326
Fahim79pk@yahoo.com

odontogenic fascial space infections.[8] The aim of this study was to determine the frequency of odontogenic fascial space infection in patients reporting to the department of dentistry/maxillofacial surgery at Hayatabad Medical Complex Peshawar and to found out the risk factors and to take possible measures for the prevention of this debilitating disease process.

MATERIAL AND METHODS

A retrospective analysis of the data recovered from the admission charts of the admitted patients was carried out who presented with odontogenic fascial space infection in the department of Oral and Maxillofacial Surgery Hayatabad Medical Complex, Peshawar from January 2013 to December 2018. A prior approval of the hospital ethical committee had been taken. Variables included age, gender, tooth/teeth involved, involvement of the fascial space, systemic illness concomitantly with odontogenic fascial space infection, ICU care, surgical airway (tracheostomy) and mortality rate. The data was entered in SPSS version 17. Frequencies for each variable were found out and the mean age was also recorded.

RESULTS

A total of 202 patients presented with odontogenic fascial space infection out of 1715 patients who were attended from January 2013 to December 2018. Out of these 202 patients, 123 (60.89%) were males and 79 (39.11%) were females. The mean age was 31.37 years. Most of the patients ranged from 21 to 40 years of age. Mandibular teeth were most commonly involved. Mandibular first molar was found to be the most frequent tooth. Submandibular space was found to be the most frequent finding. One patient was reported with brain abscess while two patients were reported with descending mediastenitis due to odontogenic origin. Three patients needed surgical airway (tracheostmy) while three patients needed surgical ICU care. Among these patients 103 (6%) were diabetic.

DISCUSSION

Odontogenic fascial space infection in our society may be attributed to decreased awareness to the oral hygiene measures and certain health issues which may predispose to the Odontogenic fascial space infection like diabetes mellitus and preganacy. The most common infections of odontogenic origin are periapical abscess, pericoronitis and periodontal abscess which can further spread to other fascial spaces. [11]

A total of 1715 were seen in Out patient department/emergency department of the dentistry/maxillofacial unit from January 2013 to December 2018 out of which 202 patients were found to be having odontogenic infection and resultant fascial space infection. Out of these 202 patients, 123 (60.89 %) were males and 79 (39.11 %) patients were females with male to female ratio of 1.5:1 with slight male predominance.

Huang et al.[12]reported 50% odontogenic infections in 185 cases only of the deep neck infections in Taiwan. Zhang et al.[13] reported 56.1% among 212 cases of fascial space infection in China and Bross-Soriano et al[14] reported 89% in their 121 cases of Ludwig›s angina in Mexico.

The mean age in the present study was 31.37 years. Most of the patient's age ranged from 21 to 40 years in our study. In another study a total of 2058 (48.59%) patients with odontogenic fascial space infection were reported by Mahmood[15] out of 4209 emergencies (48.89%) and reported mean age of 37.5 years. Although children may acquire maxillofacial infections, the majority occur in adults.[12,13,14,17,18,19] The probable reason for adults being at higher risk is the neglect of oral health and the higher prevalence of systemic diseases that compromise immunity.

A high male to female ratio in our study corresponds with most of the previous studies[12,13,16,17,19] There is some evidence that women tend to have better oral health and seek oral health care more frequently.[20]

Mandibular teeth were the frequent most with 64.35% cases and maxillary teeth were recorded with frequency of 35.64%. Mandibular first molar was found to be the most frequent tooth followed by mandibular second and third molar with frequencies of 41.02%, 33.6% and 31.13% respectively in the present study. The reason for frequent involvement of the first molar

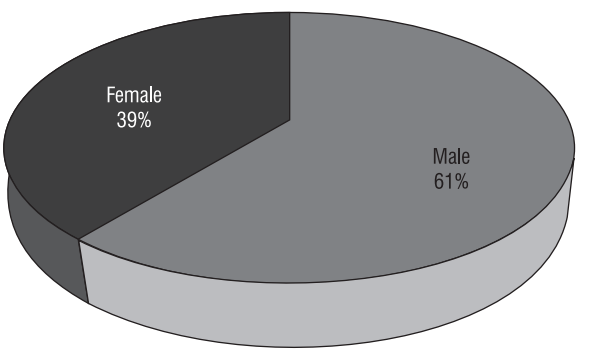

Table 1: Gender distribution

Table 2: Age distribution

Age (years)	Nmb	%
1-10	0	0
11-20	11	5.44
21-30	104	51.48
31-40	74	36.63
41-50	9	4.45
51-60	4	1.98
Total	202	100

Table 3: Teeth involved

Mandibular teeth 130(64.35%)			Maxillary teeth 72 (.5.64%)		
Teeth	**Nmb**	**%**	**Teeth**	**Nmb**	**%**
rt 8	18	8.91	Rt 6	9	4.4
left 78	16	7.92	Lt 6	8	3.96
rt 678	15	7.4	Rt 567	7	3.46
lt 678	14	6.9	lt 67	5	2.47
rt 67+ lt 6	13	6.43	Lt 56	10	4.95
rt 7+left 67	10	4.95	Rt 45	8	3.96
lf 456	12	5.94	Lt 45	7	3.46
Rt 45	13	6.43	Lt 456	5	2.47
Lt 6	9	4.45	Rt 67	8	3.96
Rt 6	10	4.95	Rt 7	5	2.47

Table 4: Fascial space involvement

Fascial space	Nmb	%
Submandibular	51	25.24
Submandibular+buccal	25	12.37
Submandibular+pterygomandibular	20	9.9
Submandibular+lateral pharyngeal	22	10.89
Pterygomandibular	21	10.39
Buccal	44	21.78
Palatal	19	9.4
Brain abscess	1	0.49
mediastenitis	2	0.99
Total	202	11.8

Table 5: Co morbidities

Type	Nmb	%
Diabetes mellitus	103	50.99
Diabetes Mellitus+cvs disease	26	12.87
Pregnancy	20	9.9

may due to its early eruption in permanent dentition and exposure to the harsh oral environment for a longer period of time than other teeth. Secondly, children are usually not aware of their oral hygiene and brush techniques. Third molar had been reported to be the most commonly involved tooth in some studies[9, 21, 22] while lower first and second molar accounted 25% frequency each[8,20]

Submandibular space was found to be the most frequent finding with a frequency of 25.24% cases followed in desecending order by buccal space alone 21.78 % cases, submandibular space plus buccal space 12.37% cases, submandibular plus lateral pharyngeal space 10.89% cases, pterygomandibular 10.39% cases, submandibular plus pterygomandibular space 9.9 % cases and palatal space 9.4% cases. One patient was reported with brain abscess while two patients were reported with descending mediastenitis due to odontogenic origin. The extensive involvement of the submandibular space in our study may be attributed to the increased frequency of the mandibular teeth as the source of odontogenic infection. Incision and drainage along with extraction of the culprit teeth had been done in all the patients in the present study. The submandibular space has been reported to be the most commonly involved space in various other studies.[10,13, 17, 23, 24] Adults tend to have more mandibular infections, while children tend to have maxillary infections.[17] The mandibular buccal,[18] the lateral pharyngeal,[12] and the pterygomandibular spaces,[19] have been reported to be the most common in some studies.

The present study revealed 50.99% (103) diabetic patients, diabetic plus cardiovascular diseases comprised of 12.87% (26) cases and pregnant ladies comprised of 9.9% (20) cases among total of 202 patients. Prevalence of diabetes concomitantly with OFSI varies from 4.4% to 88.9 %.[8,12,22,25]

Cardiovascular diseases were reported in 17.2% of cases while Diabetes Mellitus was noticed in 4.4% of cases concomitantly with odontogenic fascial space infections by Cachovan G.[8]

In another study conducted by Sana Wazir[21], twenty seven (27) pregnant ladies had presented with fascial space infection. Pregnancy is accompanied by many physiologic changes which place the mother at a higher risk of infection or having serious consequences once infected. The immune response is greatly diminished during pregnancy, thus resulting in potential faster progression of an infection. Further compounded by altered neutrophil chemotaxis, cell mediated immunity and natural killer cell activity and also there is decreased

in oxygen reserve of gravid patient. [26, 27, 28]

Three patients (1.48%) needed surgical airway and tracheostomy was performed for airway maintenance. Lower incidence of surgical airway may be attributed to the early reporting of the emergencies to our set up and early response in the form of medical and surgical care i.e. incision and drainage along with extraction of the culprit tooth. Three of the patients (1.48%) needed intensive care unit. Among that one patient had brain abscess and two had descending mediastenitis. Two patients had died due to the Odontogenic fascial space infection with a mortality rate of 0.99%.

CONCLUSION

Mean age in the present study was 31.37 years. Male to female ratio of 1.5:1 was recorded. The mandibular teeth were most commonly involved accounted as 64.35% and maxillary teeth as 35.64%. Submandibular space was the most common site comprising of 25.24% cases. Out of 202 patients of Odontogenic fascial space infection, one hundred and forty nine patients (73.76%) were found to be having underlying systemic illness for instance diabetes mellitus (50.99%), diabetes mellitus combined with cardiovascualar diseases (12.87%) and pregnancy (9.9%). Surgical airway was needed in 1.48 % of cases and surgical ICU care was provided to 1.48% of patients. Mortality rate was 0.99%.

Recommendation

Steps must be taken for the awareness of the public through print and electronic media walks etc regarding oral hygiene care and grave consequences of the neglected mouth and teeth.

Multidisciplinary approach must be developed in order to diagnose the orofacial infection at the very early stage.

Diabetic patients and pregnant ladies must have their frequent consultations regarding their oral hygiene and oral health.

REFRENCES

1. Jiménez, Y; Bagán, JV; Murillo, J; Poveda, R (2004). "Odontogenic infections. Complications. Systemic manifestations" (PDF). Medicina oral, patologia oral y cirugia bucal. 9 Suppl: 143–7, 139–43.
2. Fragiskos, Fragiskos D. (2007). Oral surgery. Berlin: Springer. pp. 205–206.
3. Kenneth M. Hargreaves Stephen Cohen; web, Louis H.Berman, eds. (2010). Cohen's pathways of the pulp (10th ed.). St. Louis, Mo.: Mosby Elsevier. pp. 590–595.
4. Newlands C, Kerawala C (2010). Oral and maxillofacial surgery. Oxford: Oxford University Press. pp. 374–375.
5. Topazian RG, Goldberg MH, Hupp JR (2002). Oral and maxillofacial infections(4. ed.). Philadelphia: W.B. Saunders. pp. 188–213.
6. Norton NS (2007). Netter's Head and Neck Anatomy for Dentistry. Philadelphia PA: Saunders Elsevier. pp. 460–472.
7. Flynn TR. Complex odontogenic infection. In: Hupp JR. 111 EE, Tucker MR. contemporary oral and maxillofacial surgery. 5th ed. India: Elsevier publishers 2009; 317-36.
8. Cachovan G, Phark JH, Pohlenz P, Platzer U. Odontogenic infections: An 8-year epidemiologic analysis in a dental emergency outpatient care unit J Acta Odontologica Scandinavica, vol 71, 2013-issue 3-4.
9. Seppanen L, Rautemea R, Lindqvist C, Lautio A. Changing clinical features of odontogenic maxillofacial infections. Clin Oral Invest. 2010;14:459–465.
10. V. Yuvaraj. Maxillofacial Infections of Odontogenic Origin: Epidemiological, Microbiological and Therapeutic Factors in an Indian Population. Indian J Otolaryngol Head Neck Surg. 2016 Dec; 68(4): 396–399.
11. Piriz RL, Angulair L, Gimenez MJ. Management of odontogenic infection of pulpal and periodontal origin. Med Oral Patol Oral Cir Bucal 2007; 12:154-9.
12. Huang, T.T., Liu, T.C., Chen, P.R., Tseng, F.Y., Yeh, T.H., and Chen, Y.S. Deep neck infection: analysis of 185 cases. Head Neck. 2004; 26: 854–860
13. Zhang, C., Tang, Y., Zheng, M., Yang, J., Zhu, G., Zhou, H. et al. Maxillofacial space infection experience in West China: a retrospective study of 212 cases. Int J Infect Dis. 2010; 14: e414–e417
14. Bross-Soriano, D., Arrieta-Gomez, J.R., Prado-Calleros, H., Schimelmitz-Idi, J., and Jorba-Basave, S.Management of Ludwig's angina with small neck incisions: 18 years experience. Otolaryngol Head Neck Surg. 2004; 130: 712–717
15. Mahmoodi B et al. Odontogenic Infections: A 1-year Retrospective Study. J Contemp Dent Pract. 2015 Apr 1;16(4):253-8.
16. Uluibau, I.C., Jaunay, T., and Goss, A.N. Severe odontogenic infections. Aust Dent J. 2005; 50: S74–S81
17. Wang, J., Ahani, A., and Pogrel, M.A. A five-year retrospective study of odontogenic maxillofacial infections in a large urban public hospital. Int J Oral Maxillofac Surg. 2005; 34: 646–649
18. Sato, F.R., Hajala, F.A., Filho, F.W., and Moreira, R.W. Eight-year retrospective study of odontogenic origin infections in a postgraduation program on oral and maxillofacial surgery. J Oral Maxillofac Surg. 2009; 67: 1092–1097
19. Flynn, T.R., Shanti, R.M., Levi, M.H., Adamo, A.K., Kraut, R.A., and Trieger, N. Severe odontogenic infections, part 1: prospective report. J Oral Maxillofac Surg. 2006; 64: 1093–1103)
20. Zakrzewska, J.M. Women as dental patients:

are there any gender differences?. Int Dent J. 1996;46: 548–557)

21. Wazir S, Khan M, Wazir A. Odontogenic fascial space infections in pregnancy: A study.

22. Mathew GC et al. Odontogenic maxillofacial space infections at a tertiary care center in North India: a five-year retrospective study. April 2012Volume 16, Issue 4, Pages e296–e302

23. Rega, A.J., Aziz, S.R., and Ziccardi, V.B. Microbiology and antibiotic sensitivities of head and neck space infections of odontogenic origin. J Oral Maxillofac Surg. 2006; 64: 1377–1380)

24. Boscolo-Rizzo, P. and Da Mosto, M.C. Submandibular space infection: a potentially lethal infection.Int J Infect Dis. 2009; 13: 327–333).

25. Parhiscar, A. and Har-El, G. Deep neck abscess: a retrospective review of 210 cases. Ann Otol Rhinol Laryngol. 2001; 110: 1051–1054.

26. Silver RM, Peltier MR, Branch DW. The immunology of pregnancy, In: CreasyRK, Resnik R, eds. Maternal Fetal Medicine: Principles and Practice. Philadelphia, Pa;W.B. Saunders;2004;89-109.

27. Lawrenz DR, Whitley BD, Helfrick JF. Considerations in the management of maxillofacial infections in the pregnant patient. J of Oral and Maxillofac Surg. 1996; 54(4); 474-485.

28. Turner M, Aziz Sr, Management of the pregnant oral and maxillofacial surgery patient. J Oral Maxillofac Surg. 2002;60;1479-88.