International Journal of Dental Research
www.dentaljournal.net
Online ISSN: 2664-9055, Print ISSN: 2664-9047
Received: 15-04-2023, Accepted: 30-04-2023, Published: 16-05-2023
Volume 5, Issue 2, 2023, Page No. 43-49

Radicular cyst extending into the maxillary sinus with Pantoea isolates: A case report

Marimuthu P[1*], Ghulam Sarwar Hashmi[2], Tabish Ur Rahman[3], Abdus Sami[4], Akash Ganguly[1]
[1] Junior Residents, Department of Oral and Maxillofacial Surgery, Dr. Z.A. Dental College, Aligarh Muslim University, Aligarh, Uttar Pradesh, India
[2] Professor and chairman, Department of Oral and Maxillofacial Surgery, Dr. Z.a. D.c and Hospital, Aligarh Muslim University, Aligarh, Uttar Pradesh, India
[3] Assistant Professor, Department of Oral and Maxillofacial Surgery, Dr. Z.a. D.c and Hospital, Aligarh Muslim University, Aligarh, Uttar Pradesh, India
[4] Senior Resident, Department of Oral and Maxillofacial Surgery, Dr. Z.a. D.c and Hospital, Aligarh Muslim University, Aligarh, Uttar Pradesh, India

Abstract
Radicular cyst is an inflammatory odontogenic cyst associated with the root apex of a non-vital tooth.
Pantoea Dispersa is a genus of gram-negative bacteria of the family Erwiniaceae, recently separated from the genus Enterobacter. The genus Pantoea is a rare pathogen in a clinical setting. It has been reported to cause other infections, including respiratory infections, neonatal sepsis, and bloodstream infections.
This is a unique case since this microorganism has not been found commonly in any odontogenic cyst cases till now.

Keywords: radicular cyst, maxillary sinus, Pantoea Dispersa

Introduction

Radicular cyst is an inflammatory odontogenic cyst associated with the root apex of a non-vital tooth. Because of the high incidence of pulpal pathology, it is the most common cyst of the oral and maxillofacial region [1]. Radicular cysts can occur at any age, they originate from an epithelial rest of Malassez in periodontal ligaments secondary to inflammation [2]. They are most frequently found at the apices of the involved teeth with infected or necrotic pulps; however, they may also be found on the lateral aspects of the roots in relation to accessory root canals [3]. Clinically, these cysts are associated with a tooth that is carious, has undergone previous restorative care, has sustained trauma, or is an apparent failure of root canal therapy. Radio-graphically, an apical radiolucency will be noted, but rarely will there be bony expansion unless there is secondary infection. Histopathologically, the radicular cyst is a chronic inflammatory lesion with a closed pathological cavity. It is lined either partially or completely by non-keratinised stratified squamous epithelium.

Here we are reporting an interesting and rare micro-organism pantoea dispersa found in peri-apical cyst.

Review of literature

Odontogenic cysts can be broadly divided into developmental and inflammatory types based on their aetiology. Inflammatory odontogenic cysts include the radicular cysts and the lateral periodontal cysts. Radicular cysts (apical periodontal cyst, dental root end cyst) are the most common inflammatory odontogenic cysts of tooth bearing areas of the jaws [1].

They originate from an epithelial rest of Malassez in periodontal ligaments secondary to inflammation [2].

They are most frequently found at the apices of the involved teeth with infected or necrotic pulps; however, they may also be found on the lateral aspects of the roots in relation to accessory root canals [3].

Mustafa and Murat metin *et al*, found Streptococcus milleri Group (SMG) (23.8%) Streptococcus constellatus (19.1%) and Streptococcus anginosus (4.7%), Streptococcus sanguis (14.3%), Streptococcus mitis (4.7%), Streptococcus cremoris (4.7%), Peptostreptococcus pevotii (4.7%), Prevotella buccae (4.7%), Prevotella intermedia (4.7%), Actinomyces meyeri (4.7%), Actinomyces viscosus (4.7%), Propionibacterium propionicum (4.7%), Bacteroides capillosus (4.7%), Staphylococcus hominis (4.7%), Rothia denticariosa (4.7%), Gemella haemolysans (4.7%), and Fusobacterium nucleatum (4.7%) in culture of periapical cysts [4].

Pantoea is a Gram-negative, non-encapsulated, non-spore-forming, ubiquitous straight rod which can be isolated from geographical and ecological sources such as plant surfaces, buckwheat seeds, human feces, and environment. The genus Pantoea is a rare pathogen in a clinical setting, and is divided into 20 different species such as Pantoea agglomerans, Pantoea ananatis, Pantoea deleyi, Pantoea dispersa, Pantoea septica, Pantoea stewartii or Pantoea rwandensis. Pantoea dispersa has been reported to cause other infections, including respiratory infections, neonatal sepsis, and bloodstream infections [5].

Facultative anaerobes 2.76 x $10^{[3]}$ CFU/ml in RCs (Actinomyces spp. Actinomyces naeslundii

Peptostreptococcus spp, Porphyromonas asaccharolytica, Prevotella spp. Propionibacterium spp. Propionibacterium acnes, Veillonella parvula), and for obligate anaerobes 8.14 x10 [3] in RCs) was found [6].

Case report

An 18 year old male patient attended the out patients department of Department of oral and maxillofacial surgery of Dr. Ziauddin Ahmad Dental College and Hospital, Aligarh with chief complaints of swelling and pus discharge in relation to right upper front tooth region since 20 days. Patient gives history of swelling and pus discharge in relation to right upper front tooth region. Then he went to some private clinic and they advised medication. Patient didn't get relief from those medications. Then patient reported to our OPD and he was evaluated clinically and CT scan was advised.

On examination, there was an approximately 3x3 cm [2] oval swelling over the right side of face region with its extent antero-posteriorly from ala of nose to cheek hallow region. Supero-inferiorly, approximately 3 cm from infraorbital margin till corner of mouth on right side. (Fig.1) It had diffuse borders, non tender and smooth surface without any sinus discharge. Intraorally, ovoid swelling present distal to the right lateral incisors to mesial to right second premolar region. Superiorly it extends till vestibule and inferiorly till cervical margin of tooth. Active pus discharge present in relation to canine on right side. Swelling was compressible, firm in consistency and non-tender on palpation.

Fig 1: Extra oral view shows swelling at right side of face

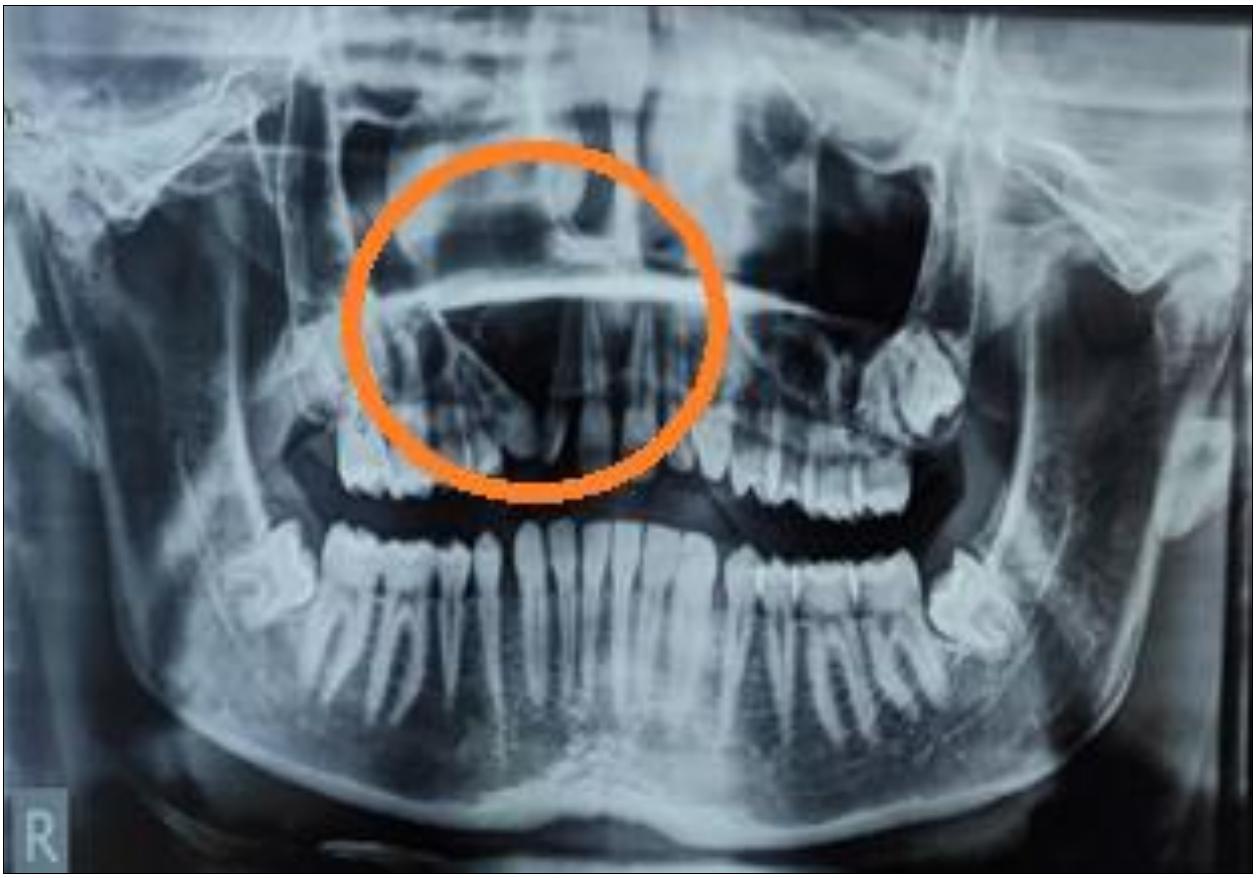

Fig 2: Orthopantomogram shows oval shaped radiolucency between maxillary right lateral incisor to right canine

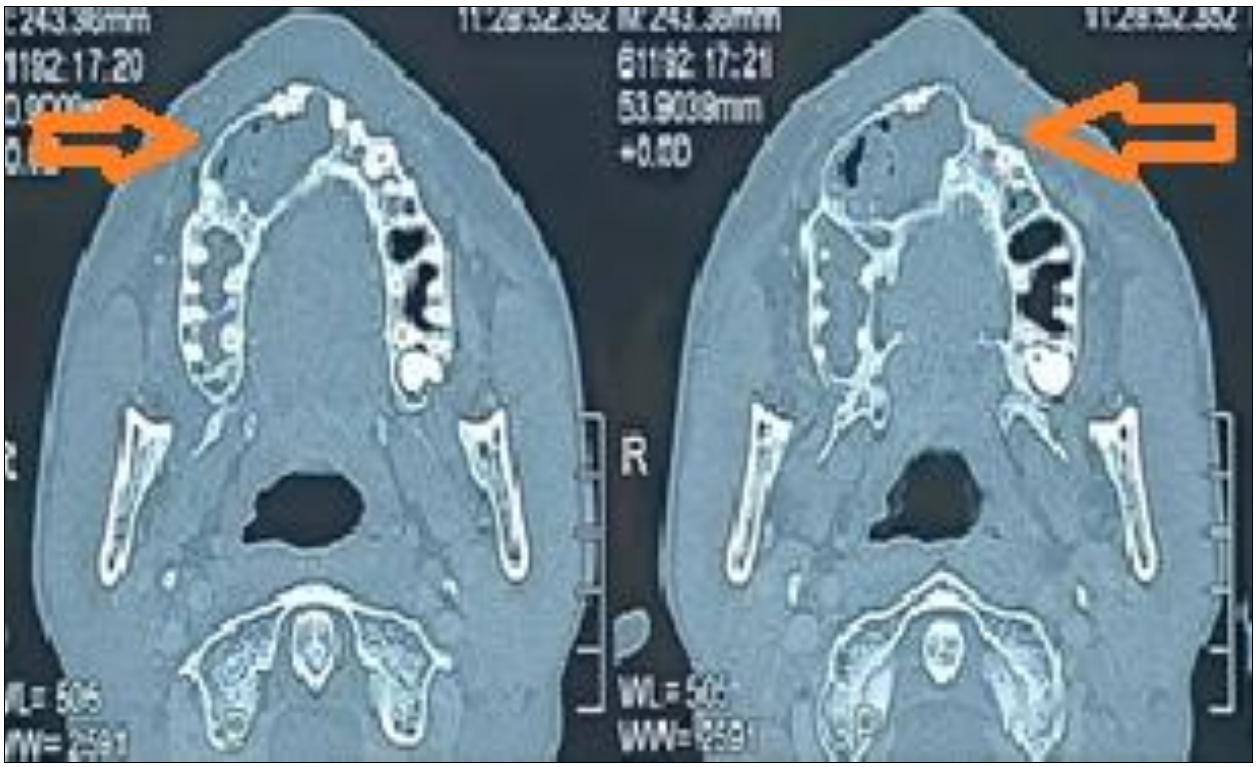

Fig 3: Axial view of CT shows well defined lytic lesion

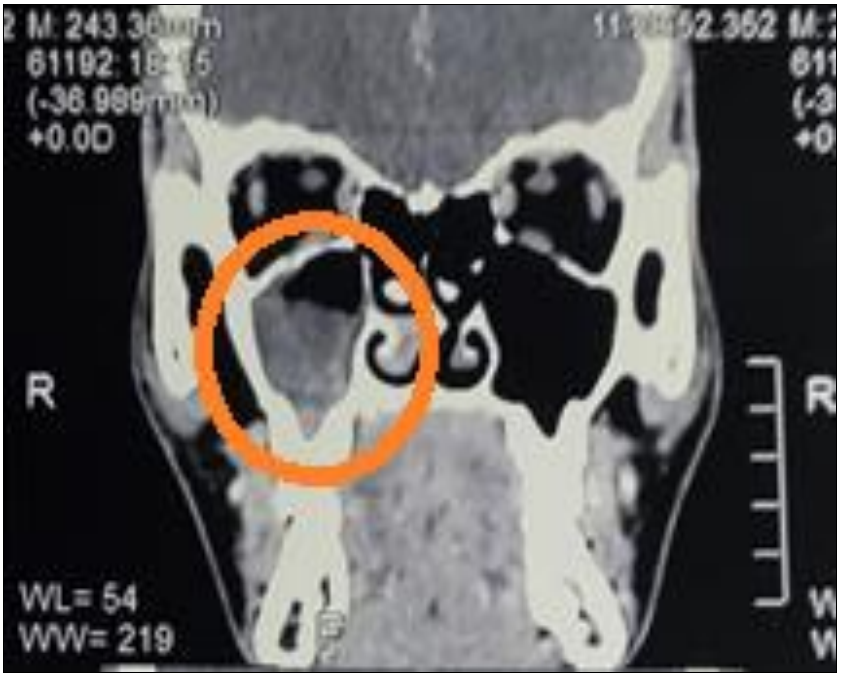

Fig 4: Coronal View shows bulging with respect to right maxillary sinus

Orthopantomogram (Fig.2) reveals, ovoid radiolucent lesion in relation distal to right lateral incisor to mesial to right second premolar with unilocular nature and borders are well defined.

CT (Fig.3 and Fig.4) reveals, well defined lytic lesion with hypodense collection and air- fluid level with rim of surrounding bone and areas of focal cortical defect seen deep to the root right central incisor and lateral incisor and canine teeth bulging into the right maxillary sinus causing secondary right maxillary sinusitis (periapical abscess).

After initial assessment the surgical plan was made which aimed enucleation and curettage. The surgery was performed under general anaesthesia with naso-endotracheal intubation. A crevicular incision was given from right lateral incisor to first molar region using by no.15 bard parker and releasing incision was given on distal to lateral incisor. Then mucoperiosteal flap was elevated and anterior wall of maxilla exposed. Bony window was created approximately 2x2 cm [2] size buccally. Cystic content was aspirated and cystic lining removed completely (Fig.5 and Fig.6) and currttage was done. Consistency of the Cystic contents looked mixed with pus and sent for pus culture and sensitivity examination. Then cystic lining was sent for histo-pathological examination. Surgical site was irrigated with betadine and normal saline. Closure was done by resorbable sutures (vicryl 3-0). The whole surgical procedures went un- eventful.

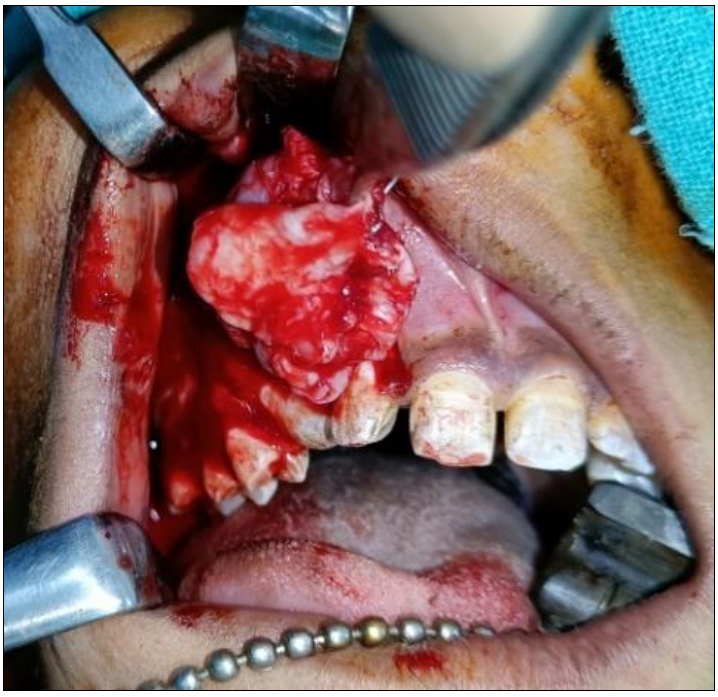

Fig 5: showing Enucleation of the cystic lining

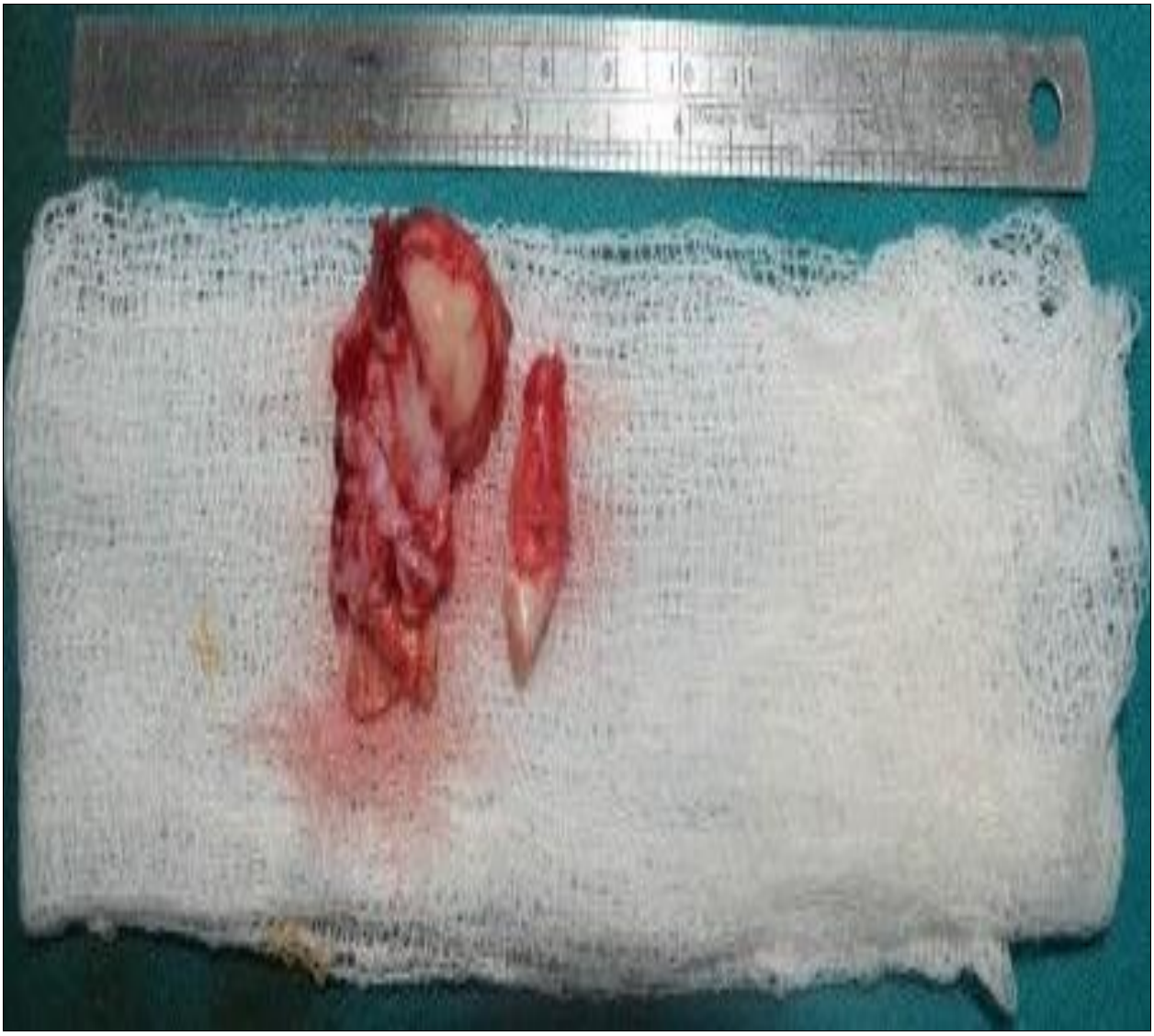

Fig 6: Showing enucleated cystic lining with canine tooth

Pus culture and sensitivity report (Fig.7) reveals pantoea dispersa microorganism and sensitivity shows trimethoprim and sulfamethoxazole combination drug and they are minimum inhibitory concentration around <=20. Patient was advised to take these combination drugs for one week and kept on follow up.

Histo-pathological reports reveals, non- keratinised squamous epithelium lining. Underlying stroma is fibro collagenous with lymphoplasmacytic infiltrate. Dilated and congested blood vessels also seen. Consistent with periapical cyst.

Table 1: Pus culture and sensitivity report.

Microorganism from pus culture	Pantoea dispersa
Analysis time	9.58 Hours.
Sensitive antimicrobials	Trimethoprim and sulf methoxazazole
Intermediate sensitivity	Colistin

Discussion

Radicular cysts arise from periapical granulomas with respect to the non vital teeth. They are the most common lesions [7, 8] among tooth-originated periapical lesions, apart from periapical abscess [7] and periapical granulomas [8]. In addition, radicular cysts are the most common among all jaw cysts [9, 10].

Iatrou *et al.* [11] determined in their study performed on infected jaw cysts that anaerobic bacteria (89.2%) comprised a large part of the isolated bacterial species. Aerobe and facultative anaerobic bacteria growth were seen in 10.8% of the cases. For all that, in this study, of the microorganisms isolated from sample cultures, 14 (66.7%) were facultative anaerobic and 7 (33.3%) were obligate

anaerobic bacteria. The isolated bacteria were determined to be the elements of normal oral flora.

Streptococcus milleri groups have also been reported to be one of the significant pathogens [12]. However, these pathogens are part of the normal flora of human oral cavity and other mucous membranes [13-16].

Pantoea dispersa is a gram-negative bacterium frequently found in plants, soil, and water. The genus Pantoea is a rare pathogen in human infectious diseases. The known susceptible populations include infants and postoperative and immunocompromised patients. To date, there are no reports of nosocomial bloodstream infection due to P. dispersa following chest puncture. A 72-year-old Chinese woman suffering from chest distress was found to be blood culture positive for this gram-negative bacterium. The organism was identified as P. dispersa through VITEK 2, MALDI-TOF MS, and 16S rRNA gene sequencing. Although cefoperazone-sulbactam and imipenem were used for treatment, the patient died four days later. To the best of our knowledge, this is the first case of nosocomial bloodstream infection caused by P. dispersa in China [17].

Acute rhinosinusitis caused by P. dispersa resulted in less surgical interventions and shorter treatment durations. Olfactory dysfunction may imply longer course and possibility for surgical intervention in chronic rhinosinusitis. The present study revealed that P. dispersa had the potential to colonize in human sinonasal cavities and cause rhinosinusitis [18].

In our radicular cyst case we found pantoea dispersa. Todate we haven't be able to find any articles or review of literature specifying the presence of this unique micro organism in the bacterial isoltes from the culture obtained from caeses of periapical cyst.

Conclusion

We came across a case of pantoea dispersa in the bacterial isolates of radicular cyst, which is the first report as far as we could research. In future more cases of the same bacteria should be collected and examined to deeply understand the epidemiology and presence of this bacteria and further research is essential too.

References

1. Krishnamurthy V, Haridas S, Garud M, Vahanwala S, Nayak CD, Pagare SS. Radicular cyst masquerading as a multilocular radiolucency. Quintessence Int,2013:44(1):71-3. doi: 10.3290/j.qi.a28740. PMID: 23444164.
2. Shear M. Cysts of the oral and maxillofacial regions. 3rd edn. Boston: Wright, 1992.
3. Pekiner FZ, Borahan O, Ugurlu F, *et al*. Clinical and radiological features of a large radicular cyst involving the entire maxillary sinus. MUSBED,2012:2:31–6.
4. Tek M, Metin M, Sener I, Bereket C, Tokac M, Kazancioglu HO, *et al*. The predominant bacteria isolated from radicular cysts. Head Face Med,2013:9:25. doi: 10.1186/1746-160X-9-25. PMID: 24011184; PMCID: PMC3846685.
5. Asai N, Koizumi Y, Yamada A, Sakanashi D, Watanabe H, Kato H, *et al*. Pantoea dispersa bacteremia in an immunocompetent patient: a case report and review of the literature. J Med Case Rep,2019:13(1):33. doi: 10.1186/s13256-019-1969-z. PMID: 30755259; PMCID: PMC6373044.
6. Scalas D, Roana J, Boffano P, Mandras N, Gallesio C, Amasio M, *et al*. Bacteriological findings in radicular cyst and keratocystic odontogenic tumour fluids from asymptomatic patients. Arch Oral Biol,2013:58(11):1578-83. doi: 10.1016/j.archoralbio.2013.07.009. Epub 2013 Aug 7. PMID: 24112722.
7. Ramachandran Nair PN, Pajarola G, Schroeder HE. Types and incidence of human periapical lesions obtained with extracted teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod,1996:81(1):93-102. doi: 10.1016/s1079-2104(96)80156-9. PMID: 8850492.
8. Becconsall Ryan K, Tong D, Love RM. Radiolucent inflammatory jaw lesions: a twenty-year analysis. Int Endod J,2010:43(10):859-65. doi: 10.1111/j.1365-2591.2010.01751.x. Epub 2010 Aug 3. PMID: 20738428.
9. Avelar RL, Antunes AA, Carvalho RW, Bezerra PG, Oliveira Neto PJ, Andrade ES. Odontogenic cysts: a clinicopathological study of 507 cases. J Oral Sci,2009:51(4):581-6. doi: 10.2334/josnusd.51.581. PMID: 20032611.
10. Sharifian MJ, Khalili M. Odontogenic cysts: a retrospective study of 1227 cases in an Iranian population from 1987 to 2007. J Oral Sci,2011:53(3):361-7. doi: 10.2334/josnusd.53.361. PMID: 21959665.
11. Iatrou IA, Legakis N, Ioannidou E, Patrikiou A. Anaerobic bacteria in jaw cysts. Br J Oral Maxillofac Surg,1988:26(1):62–69.
12. Whiley RA, Beighton D, Winstanley TG, Fraser HY, Hardie JM. Streptococcus intermedius, Streptococcus constellatus, and Streptococcus anginosus (the Streptococcus milleri group): association with different body sites and clinical infections. J Clin Microbiol,1992:30(1):243–244.
13. Poole PM, Wilson G. Occurrence and cultural features of Streptococcus milleri in various body sites. J Clin Pathol,1979:32(8):764–768.
14. Ruoff KL, Kunz LJ. Identification of viridans streptococci isolated from clinical specimens. J Clin Microbiol,1982:15(5):920–925.
15. Unsworth PF. The isolation of streptococci from human faeces. J Hyg (Lond),1980:85(1):153–164.
16. Gossling J. Occurrence and pathogenicity of the Streptococcus milleri group. Rev Infect Dis,1988:10(2):257–285.

17. Ruan X, Qin X, Li M. Nosocomial bloodstream infection pathogen Pantoea dispersa: a case report and literature review. J Hosp Infect,2022:S0195-6701(22):00199-2. doi: 10.1016/j.jhin.2022.06.011. Epub ahead of print. PMID: 35781019.
18. Su YW, Huang WH, Yeh CF. Pantoea dispersa rhinosinusitis: clinical aspects of a rare sinonasal pathogen. Eur Arch Otorhinolaryngol, 2022. doi: 10.1007/s00405-022-07266-1. Epub ahead of print. PMID: 35076743.