French, K., Jagsi, A., Main, B. G., & Thomas, S. J. (2019). Orbital complications following extraction of mandibular molar teeth: a case report. *Oral Surgery*, 12(1), 75-80. <https://doi.org/10.1111/ors.12381>

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Orbital complications following extraction of mandibular molar teeth: a case report

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Date of submission: 04/09/2015

Date of Resubmission: 15/04/2018

Date of second resubmission: 27/04/2018

Key Words

Orbital cellulitis, anatomy, spread of infection, dental extraction, odontogenic infection

Abstract

Serious sequelae of dental infections are unusual but can be potentially life- or sight-threatening. This case describes the rapid and extensive development of a fascial space infection through an uncommon route, originating in mandibular molar teeth to involve the orbital tissues. Relevant surgical anatomy and pathophysiology are discussed. Also highlighted is the multidisciplinary management of care across three surgical specialities with input from the radiology and microbiology teams.

Clinical Relevance

This case illustrates a rare, but potentially extremely serious, complication of infection following the extraction of mandibular teeth. Infection involving the orbit is not commonly linked to extraction of lower teeth, but surgeons should be aware that it could occur. Identification of the cause of infection ensures correct and effective treatment is delivered and this is demonstrated in this case report.

Case Report

A fit-and-well 29-year-old male presented with progressive right sided circumorbital cellulitis on a background of right periorbital, temporal and preauricular cellulitis. The patient had been transferred from a district general hospital, where a baseline CT scan of the face had been undertaken, showing an orbital collection, requiring urgent treatment by the ophthalmic surgical team (Figures 1 and 2). Due to the initial lack of Oral and Maxillofacial Surgery input the mandible was omitted from the original scan and did not include the inferior border of the collection. The patient had very restricted eye movements and the ophthalmology team were unable to carry out HESS charting. On admission the patient was transferred to the eye hospital due to worsening right circumorbital, pre-auricular and temporal swelling. There was ophthalmoplegia on the affected side, but his visual acuity was normal throughout presentation and recovery. Though there was gas collection indicated on the CBCT and there was oedema and erythema over the right zygomatic region there was no sign of skin necrosis. No intracranial involvement was seen on the imaging and there were no clinical signs of meningism or thrombotic complications.

FIGURE 1

Figure 1: CT showing a right orbital collection, which had an intraconal component anteriorly and inferiorly. There is an extensive collection in the right masseteric space and pterygopalatine fossa. There is maxillary bilateral, partial sinus opacification (incidental finding). The nasopharynx and oropharynx had been displaced due to the collection. The mandible was not included and thus the inferior border of the collection was not imaged.

The patient denied history of risk factors and had been tested at the original unit for underlying infections, testing negative for viral infections such as HIV. The patient was taken to theatre. The ophthalmology team drained pus from the orbit by opening the lateral canthus, lateral rim, orbital floor and eyelid. An abscess cavity was found along the inferolateral orbit from where pus was also drained. A drain was inserted at the lateral canthus. The lateral canthus was reformed at the time of surgery. The ENT team performed nasal irrigation. An inferior antrostomy yielded no pus and evidence of a significant sinusitis was not found. On reflection it is likely that the maxillary opacification was an incidental finding, only indicative of underlying subclinical sinusitis not linked to the orbital infection. However, the CBCT findings were enough for the ophthalmology team to go to theatre with ENT input without considering the patient's recent history of dental extractions.

Only during the procedure, it was noted that the patient had recently (within the last 3 days) undergone surgical removal of the lower right 8, 7 and 6. The Oral and Maxillofacial Team were, therefore, called. A buccal sulcus incision to the upper right quadrant resulted in the drainage of copious pus on sub periosteal blunt dissection. Further significant amounts of pus were drained from the submasseteric space. Drains were placed in the buccal and submasseteric spaces.

FIGURE 2

Figure 2: OPG showing extraction sockets of lower right 8,7,6 teeth and regions of periapical abscess. Drains in buccal and submasseteric spaces visualised. There is a previously treated fracture of the left mandibular angle and previous extraction of the upper right 8 that had healed without complication.

Due to an allergy to penicillin and on the advice of the medical microbiologist, the patient was given ceftriaxone and metronidazole. This regime was confirmed to be suitable following microbiological analysis of a pus sample taken at the time of operation which grew *Streptococcus anginosus* and mixed anaerobes (reflected in the mixture of thin '*streptococcus*-like' and thick 'anaerobic-like' pus). *S. angiosus* is part of the normal human bacterial flora as a commensal of the oropharyngeal, urogenital and gastrointestinal tracts. It is associated with multiple clinical conditions including empyema and central nervous system, liver and dental abscesses. The organism is known to be penicillin sensitive, a treatment unable to be utilised in this case.¹ Previously placed in the *Streptococcus milleri* group there has been controversy surrounding the phylogeny of *S. angiosus* and its other group members (*S. intermedius* and *S. constellatus*), with the three regrouped due to phenotypic differentiation in the 1990s due to variability in haemolysis, Lancefield grouping and DNA analysis.²

Following surgery and antibiotic treatment a subsequent CT scan showed a significant reduction in the retro-orbital collection, though small persistent collection over the inferior aspect of the right temporalis muscle was reported. Drainage of this was attempted with ultrasound guidance but failed to yield any further pus. The patient's blood markers improved steadily over his hospital stay (Figures 3 and 4). A White Blood Cell (WBC) count is used to show the number of leukocytes within a microliter (mCL) of a patient's blood. The levels of these cells rise and fall within normal ranges, however underlying pathology can cause these levels to change beyond normal ranges. In this case the infection caused the WBC count was initially raised, monitoring the number of cells per mCL allowed the clinical team to monitor

the success (or lack of success) of their interventions. The table clearly shows a reduction in WBCs and thus success of interventions. C-reactive protein (CRP) is produced by the liver in response to inflammation. Therefore, an elevated CRP indicates a source of inflammation within the body e.g. infection or post-surgical intervention. This accounts for the initial drop in CRP then plateaued in response to post-surgical inflammation in this patient's case. The CRP level then dropped to almost normal levels that would follow the trend of WBC reduction following a course of antibiotics at home. The patient reported a reduction in trismus throughout his recovery, also indicating a reduction in inflammation in the area. The drains were removed sequentially over the next four days and the patient discharged with a two-week course of clindamycin following further advice from the medical microbiologist. Further recovery was uneventful (Figure 5). The patient failed to attend subsequent follow up appointments at either the treating or original hospital.

FIGURE 3

Fig 3. CRP improvement from admission, showing post-operative plateau and following continued antibiotic therapy.

FIGURE 4

Fig 4. WBC reduction from admission, to post-operative and following continued antibiotic therapy.

FIGURE 5

Fig 5. Anterior view of the patient three days after drainage of collection, with drains removed. There is evidence of residual circumorbital swelling and pus discharge as

well as residual right sided facial swelling, but which had resolved markedly compared with the pre-operative picture.

Discussion

This case highlighted an important, potentially sight-threatening complication of odontogenic infection. Despite overall improvements in the dental health of the population, evidence suggests that the incidence of severe, spreading infection like this is increasing in the United Kingdom.³ The reasons for this trend are unclear, but may in part be due to difficulties certain sub-groups of the population have accessing dental care.⁴ To ensure timely management that would prevent the most serious complications in such cases, dental, oral, and maxillofacial surgeons must be familiar with the signs and symptoms associated with them.

Pathways for the spread of odontogenic infection into the fascial tissues of the head and neck are well-described in standard texts.⁵ The unusual feature in this case was involvement of the orbital space in an infection arising from mandibular molars. Orbital cellulitis is a recognised complication most commonly associated with infection arising in the paranasal sinuses.⁶ In the case described here, the hypothesised path of spread was *via* both the buccal space with submasseteric involvement causing right sided facial swelling, and *via* the pterygomandibular space, extending to infra temporal space and into the orbit cavity through the inferior orbital fissure.⁷

FIGURE 6

Fig 6. Proposed spread of infection from the mandibular molar teeth, schematic.

FIGURE 7

Fig 7. Axial view of the spread of infection from lower mandibular molars into the submasseteric space via the buccal space and also into the pterygomandibular space.

FIGURE 8

Fig 8. Coronal view of spread of infection from the pterygomandibular space to the infratemporal space.

FIGURE 9

Fig 9. Saggital view of the infection tracking along the lateral surface of the maxilla from the infratemporal space to the inferior orbital fissure, where it could then enter the orbit.

The signs and symptoms are due to increased pressure within the confines of the orbital bony cavity, resulting in an orbital compartment syndrome, and include proptosis, decreased visual acuity, reduced eye movements, and pain.⁶ Untreated, there may be involvement of the optic nerve and resultant loss of vision.⁶

The multi-disciplinary surgical management involving maxillofacial, ophthalmic, and ENT teams was emphasised, as was the need for continued expert support and advice from radiologists and medical microbiologists. Most infections of odontogenic origin are polymicrobial in nature but if there is failure to respond to empirical antibiotics, or they cannot be used because of allergy as in this case, the input of clinical microbiology is essential to ensure appropriate agents are used.⁸ Likewise,

reviewing imaging alongside radiologists can help more accurately locate collections of pus, likely sources of infection, and potentially provide an additional means of drainage *via* ultrasound guidance.^{9,10}

Conclusion/Summary

Severe complications associated with odontogenic infections are relatively uncommon but appear to be increasing in incidence. This paper has presented an unusual case of such a complication, has highlighted the need for careful diagnostic work-up, and stressed the importance of a multi-disciplinary approach to its management.

References

1. Fazili T, Riddell S, Kiska D, Endy T, Giurgea L, Sharngoe C, Javaid W. *Streptococcus anginosus* Group Bacterial Infections. *Am J Med Sci*. 2009; **354**(3): 257-261
2. Whiley R, Hall L, Hardie J, Beighton D. Genotypic and Phenotypic Diversity within *Streptococcus anginosus*. *Int J Sys Bact* 1997; **47**(3): 645-650
3. Thomas SJ, Hughes C, Atkinson C, Ness AR, Revington PJ. Is there an epidemic of admissions for surgical treatment of dental abscess in the UK? *BMJ* 2008; **336**: 1219-1220
4. Moles DR, Frost C, Grundy C. Inequalities in availability of National Health Service general dental practitioners in England and Wales. *Br Dent J* 2001; **190**: 548-553
5. Graham Smyth A. Management of orofacial infections. In: Ward Booth P, Schendel SA, Hausamen J-E (Eds) *Maxillofacial Surgery*, Volume 2. 2nd ed. pp1550-1560. Churchill Livingstone: St Louis, 2007
6. James B, Chew C, Bron A. *Ophthalmology Lecture Notes*. 10th ed. pp 54-55. Blackwell: Oxford, 2007
7. Zachariades N, Vairaktaris E, Mezitis M, Rallis G, Kokkinis C, Moschos M. Orbital abscess: visual loss following extraction of a tooth – case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005; **100**: e70-e73

8. Robertson D, Smith AJ. The microbiology of the acute dental abscess. *J Med Microbiol* 2009; **58**: 155-162
9. Lyle NJ, Rutherford EE, Batty VB. A pain in the neck – imaging in neck sepsis. *Clinical radiology* 2011; **66**: 876-885
10. Robertson DP, Keys W, Rautemaa-Richardson R, Burns R, Smith AJ. Management of severe acute dental infections. *BMJ* 2015; **350**: h1300