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Lemierre's syndrome – A potential fatal complication following routine dental treatment

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Abstract

Various complications may arise from routine dental treatment. One rare and potentially fatal complication, Lemierre's syndrome, is characterised by thrombosis of the internal jugular vein, septicaemia due to an anaerobic pathogen and distant infected emboli. This case report highlights the importance of timely diagnosis and appropriate surgical and medical management required to minimise morbidity and mortality associated with this potentially fatal syndrome.

Introduction

Life threatening complications associated with odontogenic infections including Ludwig's angina, mediastinitis and cavernous sinus thrombosis are relatively well recognised terms amongst the dental community. One potential complication, Lemierre's syndrome (LS), is much less well known due to its relatively rare occurrence, however it warrants special attention with general dental practitioners commonly being the first clinicians to recognise and refer infections of the head and neck region (Ghaly et al., 2013). It is characterised by clinical and radiographic signs of thrombosis of the internal jugular vein (IJV), septicaemia due to an anaerobic pathogen and distant infected emboli (Albilis et al., 2010; Rosado et al., 2009; Noy et al., 2015). It was first discovered by Andre Lemierre, a French microbiologist, in the 1930s when a series of 20 patients presented with head and neck infections and associated anaerobic septicaemia, septic emboli and thrombosis (Ghaly et al., 2013; Albilis et al., 2010). It was noted that these collective signs and symptoms resulted from a preceding oropharyngeal infection and consequently it was termed Lemierre's syndrome (Ghaly et al., 2013). Since first characterised, the reported incidence of LS rapidly dropped with the widespread use of antimicrobial therapy, so much so that it became known as the 'forgotten disease' (Hagelskjaer Kristensen and Prag, 2000; Sonsale et al., 2004; Riordan, 2007). Likewise, the mortality rate has decreased from almost ubiquitously fatal to between 4-12% with early and aggressive antibiotic therapy (Armstrong et al., 2000; Juárez Escalona et al., 2007). Recently however, with the rise of

antimicrobial resistance, anecdotal evidence suggests that the once forgotten disease may be having a slight resurgence (Albilis et al., 2010). This case report describes a patient presenting with LS on a background of recent general dental treatment. It demonstrates the importance of timely referral for suspected complications, especially those where patients show systemic signs of infection following routine dental treatment.

Case description

A 56-year-old male presented acutely to The Royal Melbourne Hospital's emergency department (ED) with rapidly progressing, generalised facial swelling and worsening malaise. Prior to presentation, he had undergone an uncomplicated extraction of his four wisdom teeth (Figure 1) by a general dentist in the community. Over a 10-day period he represented to the dentist on numerous occasions with worsening pain and swelling and systemic signs of infection, in particular chills and rigors. He was managed with analgesia, however no antimicrobial therapy was initiated. The patient's swelling progressed to limit eye opening and when trismus developed, he was advised by his dentist to present to the ED. On presentation he was found to be in decompensated septic shock, requiring aggressive resuscitation in the ED including intravenous (IV) therapy (3 L crystalloid) and a vasopressor (noradrenaline) infusion was commenced. Due to concerns about a threatened airway with widespread facial swelling and associated trismus, he underwent awake, fibre-optic intubation in ED and was transferred to the intensive care unit (ICU) for ongoing medical management.

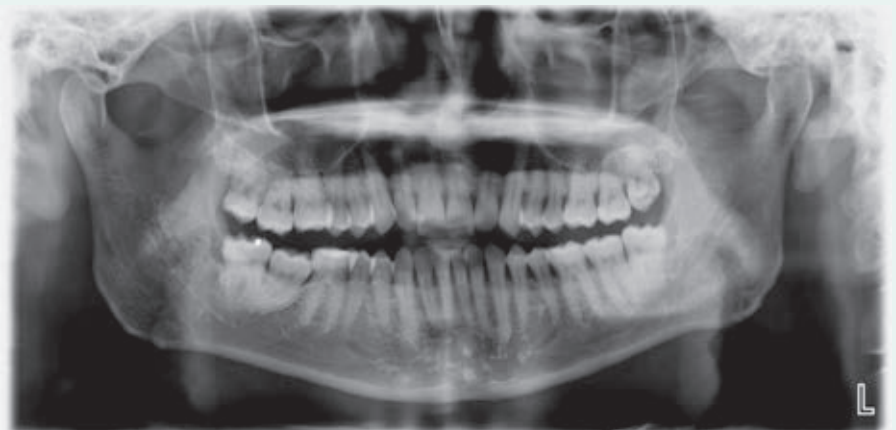


Figure 1. Panoramic dental radiograph prior to the surgical extraction of the wisdom teeth

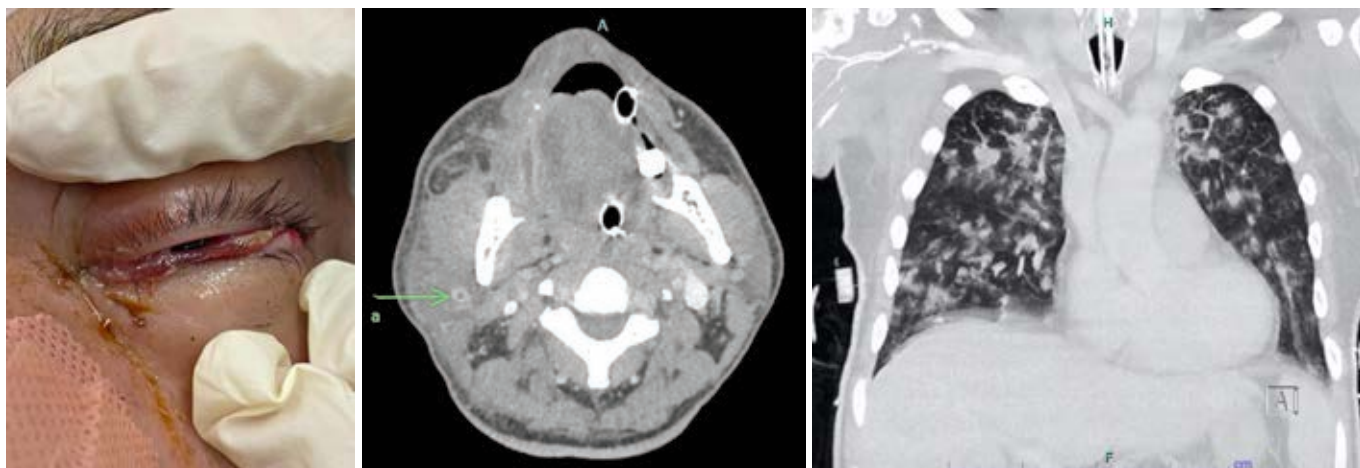


Figure 2 (left). Severe chemosis (swelling of the conjunctiva) of the patient's left eye.

Figure 3 (centre). CT scan showing thrombosis within the external jugular vein.

Figure 4 (right). CT chest showing numerous septic emboli.

His past medical history included hypertension, dyslipidaemia, obstructive sleep apnoea and colorectal cancer, although he took no regular medications. He was an ex-smoker and had heavy alcohol intake.

Initial maxillofacial review was performed in ICU while the patient was intubated and sedated and demonstrated significant right facial erythema with diffuse facial swelling, worse on the right, with widespread pitting oedema. He was also noted to have limited mouth opening and significant chemosis of his conjunctiva bilaterally (Figure 2). Initial blood tests showed a neutrophilia and significantly elevated inflammatory markers (CRP of 492). A CT (Figure 3) scan with IV contrast of his neck and chest was performed, showing extensive right sided facial cellulitis extending into the right masticator space with no definitive collection identified. Of particular interest, it showed right external jugular and retromandibular vein thrombosis and numerous septic emboli to the lungs (Figure 4), indicating the diagnosis of LS.

The patient was urgently transferred to the operating theatre and underwent an examination under anaesthetic (EUA) and incision and drainage of the right facial collection. This included exploration and placement of drains in numerous fascial spaces including the submandibular, sublingual, pterygomandibular, submasseteric, infratemporal and temporal spaces. Post operatively the patient required two weeks of ventilatory and vasopressor support in ICU and subsequently an extended hospital stay requiring input from multiple inpatient teams.

The patient received a total of 4 weeks antimicrobial therapy to manage his LS, with the suspected organism being *Fusobacterium* although no organism was formally cultured. Further imaging of his head and neck venous system with a MRI venogram showed extensive thrombus burden within bilateral cavernous sinuses, bilateral pterygoid venous plexus, right internal jugular vein and bilateral scalp/face veins with venous drainage occurring from his brain via only the left internal jugular vein. The patient was placed on therapeutic anticoagulation

for a three month period and was deemed not suitable for thrombolysis.

The patient suffered several significant and known complications of LS during his hospital stay. This included an orbital compartment syndrome secondary to significant venous congestion requiring surgical decompression, a right upper lobe segmental pulmonary embolus and a basal ganglia infarct. He also developed a left temporal brain abscess requiring a left craniotomy and drainage of the collection. After a prolonged inpatient stay the patient was transferred to inpatient rehabilitation for ongoing care.

Discussion

Prevalence

LS is thought to occur in about one per million people (Malis et al., 2008). More commonly it affects young healthy adults with 70% of reported cases occurring between 16-25 years of age (Noy et al., 2015).

Pathogenesis/Aetiology

LS is initiated by an infection in the head and neck region, commonly a recent oropharyngeal or odontogenic infection (Albilis et al., 2010). Most commonly it occurs secondarily to infections of the tonsillar and peritonsillar regions, however LS resulting from an odontogenic cause make up a small but important subset. Of the odontogenic causes, they commonly occur in exodontia patients in the post-operative period. They may however occur in other settings; Ghaly, for example reported a case of LS following routine dental treatment (Ghaly et al., 2013; Deganello et al., 2009). Odontogenic infections invading deep spaces of the head and neck can result in thrombophlebitis by direct invasion of vasculature. Infections spreading to the retrostyloid compartment of the lateral pharyngeal space can result in infected thrombophlebitis of the IJV (Albilis et al., 2010). Subsequently septic thrombi can lodge within the pulmonary vasculature, and less commonly other organs

including liver and kidneys, resulting in micro abscess formation (Albilía et al., 2010).

Retrograde flow of septic emboli from the IJV to the central nervous system can result in neurologic deficits secondary to brain abscesses or meningitis (Garimella et al., 2004).

Clinical Presentation/Signs and symptoms

The presenting symptoms of LS are variable depending on the primary site of infection and point of presentation however most patients initially present with high fever, chills and rigors (Albilía et al., 2010; Sonsale et al., 2004; Juárez Escalona et al., 2007). When a result of dental treatment, this is commonly accompanied by odontogenic pain and trismus (Albilía et al., 2010). With the development of thrombophlebitis of the IJV, pain and swelling along the sternocleidomastoid and jaw may occur (Albilía et al., 2010). Once septic emboli of the lungs occurs, patients can present with cough, dyspnoea, pleuritic chest pain and haemoptysis (Albilía et al., 2010).

Microbiology

Although LS has been caused by multiple bacteria it is most commonly caused by the anaerobic gram-negative rod *Fusobacterium necrophorum* (Jensen et al., 2007). This is an obligate anaerobe which is a normal part of oral and pharyngeal flora (Albilía et al., 2010). Other potential organisms include *Streptococcus*, *Peptostreptococcus* and *Bacteroides* (Ghaly et al., 2013; Golpe et al., 1999; Sinave et al., 1989). *F. necrophorum*, as part of its pathogenesis, produces the glycoprotein hemagglutinin which precipitates platelet aggregation and the formation of microemboli (Albilía et al., 2010).

Investigations/Diagnosis

Accurate and timely diagnosis of LS can be challenging. It requires careful consideration of the time course, symptoms and any potential previous treatment. The diagnosis is confirmed by the evidence of metastatic infection and IJV thrombosis (Armstrong et al., 2000), typically through a CT scan with contrast. Blood cultures, ideally taken prior to commencing antimicrobial therapy,

are useful in confirming LS however the growth of anaerobic organisms is technique sensitive and often unpredictable (Albilía et al., 2010). Additional tests including full blood counts, assessing white blood cell and platelet counts, and inflammatory markers including CRP are non-specific but give an indication of the severity of the presentation.

Management

Appropriate management of LS requires a prompt diagnosis and multidisciplinary approach in a centre where advanced imaging and intensive care support is available. Advanced odontogenic infections should be managed initially with aggressive surgical drainage of any purulent material and removal of the source of infection (Ghaly et al., 2013; Albilia et al., 2010). This is followed by an extended period of antibiotic therapy tailored to the offending pathogen if cultured, or with appropriate anaerobic coverage if no offending pathogen is identified (Noy et al., 2015). The delay in commencing therapy and once disseminated infections has occurred has been associated with increased mortality (Ghaly et al., 2013; Leugers and Clover, 1995). Other therapies including anticoagulation, thrombolysis and vessel ligation lack evidence and remain controversial (Noy et al., 2015). The use of ligation of the IJV is reserved for patients with recurrent emboli and persistent sepsis (Armstrong et al., 2000).

Conclusion

LS is a rare and less well known sequel of odontogenic infections. It is important that clinicians are aware of this relatively rare, albeit potential fatal condition that may arise from routine dental treatment. Due to its difficult diagnosis, a degree of suspicion is required for diagnosis and prompt referral may be potentially lifesaving. This case demonstrates that delayed referral and appropriate management can cause significant long term morbidity.

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News from the School

The Dental Librarian, Trish Leishman, retired on 29 April after working with the Faculty for over 25 years. Trish is thanked for her valuable support given to the Journal and the Association, and in particular for her work providing the Index for many volumes of this publication.