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Teaming Up to Combat a Deadly Trio of Diabetes Mellitus, Odontogenic Space Infection and Renal Failure - A Case Report

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Abstract

Odontogenic orofacial infections arise either from dental caries or periodontal infections that have extended beyond the alveolar bone to involve the fascial spaces around the face and oral cavity. Notorious enough by itself, management of a space infection in medically compromised patients, especially patients with renal problems poses an even harder challenge to the maxillofacial surgeon. Here, we are presenting a case of left buccal, sub-mandibular, submasseteric, pterygomandibular, periorbital and canine space infection, secondary to a periodontally compromised lower left molar with concomitant uncontrolled diabetes mellitus, acute kidney injury and septic shock. The patient was brought back from the brink of death, by successful team work executed by the combined efforts of the maxillofacial surgeon, nephrologist and emergency physician.

***Key Words**: Renal, Infection, Dialysis*

Introduction

This report describes a geriatric diabetic female patient who reported with severe facial swelling and signs and symptoms of sepsis. Upon presentation, what appeared to be a classical case of odontogenic space infection, was in fact hiding a more severe systemic illness. This articles describes the negative impact of the renal and cardiovascular system, along with diabetes mellitus and how it worsened what could have been an otherwise innocuous localized infection. The importance of teamwork between different specialties is also stressed upon, in this particular article.

Observation

A 53-year-old female patient, known case of Type II Diabetes Mellitus since 8 years, came with a complaint of left sided facial swelling and pain in lower left back tooth region since 5 days. Pain was continuous, gnawing and throbbing in nature. History of rubefacient application over the same site 3 to 4 times, and difficulty in swallowing was present.

On examination, a diffuse, firm cellulitis was present over the left middle and lower third of the face, and the left submandibular region. Skin over the swelling was shiny, stretched and mildly erythematous, with local rise in temperature and tenderness on palpation. Mouth opening of 15mm was noted. Intraoral examination revealed periodontally compromised 36, with tenderness on percussion and active pus discharge from the gingival crevice. A provisional diagnosis of left buccal and submandibular space infection was made, with active spread to the sub-masseteric, pterygomandibular, periorbital and canine spaces, secondary to infected 36.

Routine blood investigations showed Hb-9.3g/dl, RBS-192mg/dl, CRP 236.5mg/l, Urea 75mg/dl, Creatinine 1.5mg/dl. Renal parameters were highly deranged. Patient was severely hypotensive, with blood pressure of 80/60mmHg. Patient was tachycardic, hypotensive and had warms and flushed peripheries. On account of persistent hypotension even after repeated fluid rush, and altered renal profile, patient was taken over by the emergency medicine department.

Diagnosis of Anuria, Azotemia, Diabetic ketoacidosis, T wave inversion with sinus tachycardia was made and correction of the above disorders was started.

Due to the persistent anuria and worsening azotaemia, along with signs and symptoms of acute sepsis, patient was taken up for renal haemodialysis under the care of the nephrologist. Blood transfusion was also done for haemoglobin correction. ECG showed abnormal T wave inversion and sinus tachycardia, suggestive of progression to the cardiovascular system. Amiodarone (IV 300mg) and Lasix (IV 20mg) was administered for treatment of atrial fibrillation. Diabetic Ketoacidosis, was corrected with IV Fluid (NS) infusion and subsequent insulin administration. Culture and Sensitivity test done on the intraoral pus sample, isolated the offending species as Proteus, and appropriate antibiotics were started. In view of rapidly progressing septic shock, incision and aggressive drainage and debridement and extraction of offending tooth (36) under local anaesthesia, was carried out under antibiotic coverage (IV Ceftriaxone 1.5g BD, IV Meropenem 500mg BD, IV Metrogyl 500mg TID). Following this, 2 more rounds of haemodialysis was given, with gradual improvement of renal profile. Post-operatively, patient developed a caseous necrotic patch due to necrotising fasciitis over the left angle region of mandible, which was managed with aggressive local debridement and daily dressings. Patient was discharged with complete resolution of infection, and reversal of the renal complications.

FIGURE A FIGURE B FIGURE C FIGURE D

FIGURE E

Discussion

Despite universal access to dental care and antibiotic therapy, odontogenic infections requiring hospitalization remain a serious clinical problem. The treatment of choice for odontogenic infections is the incision and drainage of the abscess and possible removal of the odontogenic infection source in the oral cavity, if present. Abscesses, cellulitis and phlegmons can spread along the fascial planes from the skull base to the mediastinum and lead to serious and potentially lethal complications. Timely recognition and speedy management are vital to prevent sequelae.**[**1,2**]**

A study done by Rao et al concluded that diabetic patients are predisposed to microangiopathy, that prevents leukocyte migration, weakening the body's defence mechanism. The severity of infection,

hospital stay, and complications associated with the infection are considered to be greater in diabetic individuals. Our case was an uncontrolled diabetic, which was the ultimate cause of the severity of her initial spread of infection. **[**3**]**

Sepsis is a clinical state that falls along a continuum of pathophysiologic states, having the 4 cardinal signs are Fever, Tachycardia, Tachypnoea and Leucocytosis. Our patient distinctively exhibited all 4 signs of sepsis.**[**4**]**

Sepsis induced Acute Kidney Injury, is a very expected complication, being what our patient rapidly progressed to within days of developing sepsis. This study by De Vriese et al showed a higher mortality of 74.5% in AKI cases.**[**5**]**

As per a study by Zarjou et al, rising creatinine and oliguria during sepsis often appear after the window of opportunity for effective therapy has already passed. Our patient's creatinine levels were rapidly rising with every passing day, from 1.9 on day one to 5.5 on day three. This could indicate an irreversible renal state, which necessitates dialysis as the only possible treatment option.**[**6**]**

Kingsley and Jones stated that CRP, being an acute phase protein, increases during infection in response to monocytic mediators such as IL-1 and IL-6. Our patient had a CRP of 236.5, suggesting an acute state of infection.**[**7**]**

An article by Yao et al, shows that any pathologic or non-pathologic process that increases fibrin production or breakdown also increases plasma D-dimer levels, which predisposes patients o further complications such a Deep Vein Thrombosis. Our patient's levels were 1173ng/ml, showing a risk of other complications.**[**8**]**

Thrombocytopenia, is another predictor of possibility of bleeding, which can be a sign of end stage or uraemic syndrome, due to loss of coagulation factors in the urine.**[**9**]**

Culture test on the intraoral pus sample showed Proteus species. As per Armbruster et al, a striking microbiologic characteristic of Proteus species is their swarming activity, which is why it can crawl up the catheters and drip sets, leading the hospital infections, and extended hospital stay.**[**10**]**

Omar et al defined cardiorenal syndrome is "any acute or chronic problem in the heart or kidneys that could result in an acute or chronic problem of the other." This explains the progression of signs of renal failure such as oliguria and volume overload, within a few hours toward cardiovascular signs such as atrial fibrillation. Nigwekar et al said that given the accumulating evidence of harm with volume overload in critically ill patients, diuretics may be important adjuncts to judicious volume-

management strategies. A 20mg load of Lasix, did help our case in temporary alleviation of the sepsis induced volume overload and oliguria. Zimetbaum et al also noted that amiodarone is the most effective antiarrhythmic drug which was used for management of atrial fibrillation in our patient, at the emergency medicine department. As per Motayagheni et al, the judicious use of general anaesthetics also becomes critical, in case of emergency surgery in a patient with progressive renal failure. The mainstay is to avoid nephrotoxic drugs so as to ensure proper drug elimination, in such conditions.**[**11, 12, 13, 14**]**

The artificial process involving the removal of wastes and excess water from the blood is called dialysis. As the above tests proved an irreversible renal damage, our patient was immediately taken up for 1 round of hemodialysis pre-surgery, and two more rounds post-surgery. Daugirdas et al concluded that mechanical damage to platelets becomes an anticipated risk during such procedures and platelet counts should be checked every 24-48 hours. A case report by Nishide et al, led her to the conclusion that a complete blood picture and meticulous discussion with a hematologist and nephrologist becomes an indispensable part of the pre-surgical evaluation. Prophylactic antibiotic therapy should also be considered, in view of impaired wound healing in dialysis patients as per Mochizuki Y et al. **[**15,16,17,18**]**

As per a study by Alamo SM et al, in renal compromise cases, the drug dose adjustment must be done using creatinine clearance; before invasive dental procedures, a blood test must be requested (including hemostasia and blood recount). In transplant patients, the need of supplemental corticosteroid has to be considered.**[**19**]**

Conclusion

Management of a space infection with concomitant rapidly progressing renal failure requires a team approach. Our ultimate mission, is to manage the systemic complications, whilst also achieving resolution of the odontogenic infection. Under proper medical care coupled with aggressive debridement, incision and drainage, we can ameliorate the signs and symptoms of the patients and save lives. But the dictum is that co-operation from multiple specialists is the need of the hour. The triad comprising of the emergency physician, nephrologist and maxillofacial surgeon has led to a successful result, due to their timely and prompt efforts, along with availability of appropriate facilities like a dialysis unit and round the clock care at the adjacent medical hospital. This case has given us an important lesson, teaching us that we should not discount the importance of proper history taking, and accept guidance of other multi-specialities as well.

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