

Submandibular abscess caused by *Salmonella* spp. in a diabetic patient: a case report

Abdul-Aziz Alaqeeli, Belal Alani, Moustafa Al Khalil

Department of Craniomaxillofacial Surgery,
Hamad Medical Corporation, Doha, Qatar

Correspondence to Abdul-Aziz Alaqeeli,
Hamad Medical Corporation, Arab Board of
Oral and Maxillofacial Surgery, PO box 3050,
Alrayyan Street, Doha, Qatar. Tel: +974 3358
8748; fax: 44397363;
e-mail: dr_murajaa.utman@yahoo.com

Received 3 July 2017

Accepted 3 July 2017

The Egyptian Journal of Otolaryngology

2019, 35:129–132

Head and neck infections normally arise from *Streptococcus*, *Staphylococcus*, or other anaerobic species, and infection by *Salmonella* spp. is rare. Patients with significant underlying conditions are at increased risk for the development of focal infection. This has been observed in patients with HIV, diabetes, and malignancy.

Keywords:

Salmonella spp. in the neck

Egypt J Otolaryngol 35:129–132

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1012-5574

Introduction

Head and neck infections normally arise from *Streptococcus*, *Staphylococcus*, or other anaerobic species, and infection by *Salmonella* spp. is rare. Nontyphoidal salmonellosis, which is increasing nowadays in the developed countries, is manifested as enteritis in most cases, but it also encompasses bacteremia, intra-abdominal infections, and bone, joint, and soft tissue infections. These rare diseases are known to result from primary gastrointestinal infection and subsequent bacteremia with or without symptoms [1].

Salmonella spp. infections are typically classified into four categories: gastroenteritis, enteric fever, focal disease, and chronic carrier state. The infection may be localized to the gastrointestinal tract or may disseminate via the blood or lymphatic system. Focal salmonellosis is thought to be secondary to a brief episode of bacteremia after infection from the gastrointestinal tract.

Patients with significant underlying conditions are at increased risk for the development of focal infection. This has been observed in patients with HIV, diabetes, and malignancy [2].

According to a recent review, there have been approximately 10 cases of neck abscesses with soft tissue involvement by various nontyphoidal *Salmonella* reported worldwide in the past 10 years [3].

complaining of a progressively enlarging swelling of the right upper side of the neck with pain, fever, and reduced oral intake since 7 days.

On examination, the patient was conscious, alert, and oriented, and not in distress; vitals were within the normal range and had raised body temperature to 38°, with no history of recent trauma, dental pain or treatment, any abdominal pain, or abnormal bowel motion.

A swelling of the 5*4 cm right submandibular swelling was clinically evident, erythematous overlying skin, indurated and tender to palpation; trachea was central, and he was able to move the neck freely, with no trismus, no sublingual or parapharyngeal swelling, with odynophagia, and without intraoral focus of infection.

Blood workups were done. Complete blood count revealed leukocytosis (white blood cells 15 000/dl) and high random blood sugar (260 mg/dl); accordingly, hemoglobin A1c was requested, and the result was 11% to confirm undiagnosed non insulin dependent diabetes mellitus (NIDDM).

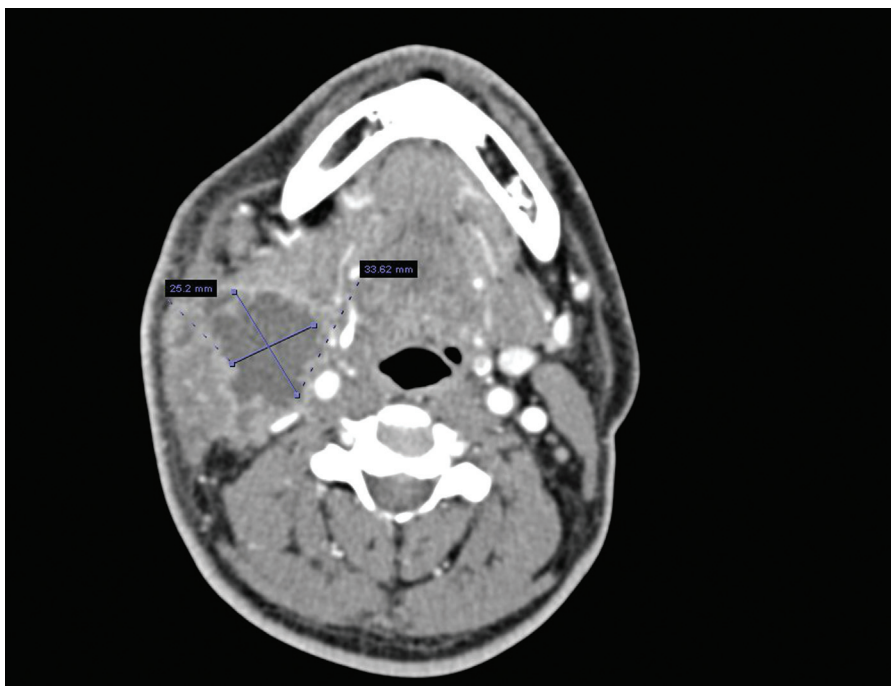
Intravenous normal saline, amoxiclav antibiotics 1.2 g three times daily and insulin to control blood glucose were initiated immediately.

The case

A 26-year-old male patient with no known medical history, presented to the emergency department in Hamada general hospital on august 2016

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Figure 1



Coronal view.

Figure 2



Axial view.

A computed tomography scan of the neck with contrast was done, which revealed a multilocular collection seen in the right submandibular region (level 2a and 2b) beneath the sternocleidomastoid muscle measuring 4.5×3.5×4.5 cm in dimension with marginal enhancement (Figs 1 and 2).

The patient was taken to the operating room, and incision and drainage was done under general anesthesia; significant amount of pus was evacuated, more than 25 ml, corrugated rubber drain inserted and specimens for culture and sensitivity and TB PCR were sent for laboratory investigations.

On the second day, the patient showed improvement of the symptoms, normal body temperature, reduced count of white blood cells and controlled blood glucose.

After 24 h, the laboratory result for tuberculosis PCR was negative, and after 72 h, the culture diagnosed *Salmonella enterica*, subtype Enteritidis, as the causative organism and sensitive to penicillin, ceftriaxone, ampicillin, ciprofloxacin, ceftriaxone and ertapenem.

Infectious disease team was consulted, and advised to continue on co-amoxiclav for a total of 2 weeks.

On the fourth postoperative day, there was almost total resolution of the swelling, good oral intake, and vitally stable with no fever. So, the drain was removed, and he was discharged home with oral antibiotics, diabetes medications as per the endocrinology team advice, and daily wound care.

A follow-up on weekly basis appointment for 2 months showed great improvement at the surgical site, and well-controlled blood glucose.

Microbiology

The pus sample was cultured in a blood agar medium, thereafter on a MacConkey agar medium, which is selective for gram-negative bacilli and differential based on lactose fermentation, where the formation of white/colorless colonies on the petri plate indicated non-lactose fermenting bacteria such as *Salmonella*, *Shigella*, *Pseudomonas*, *Proteus* species [4], and then on a Hektoen enteric agar medium, which is primarily used to differentiate *Salmonella* spp. and *Shigella* spp., as *Salmonella* spp. produces black precipitate in the presence of hydrogen sulfide, and *Shigella* spp. does not produce it and precipitates green colonies [5].

Discussion

Submandibular space infection by *Salmonella* spp. is rare [6]. The condition usually originate from oral mucosal infections, dental infections, submandibular salivary gland infection, blunt or penetrating trauma to the region, and spread from adjacent spaces, and commonly lead to culture of anaerobic bacteria: *Bacteroides* spp. and *Peptostreptococcus* spp. *Staphylococcus aureus* and *Streptococcus* species dominate among the aerobic bacteria. Other changes include the emergence of gram-negative organisms, primarily *Klebsiella* spp. as important pathogens [7]; unusual

presentation of actinomycosis of the submandibular gland had been also reported [8].

Salmonella spp. is a gram-negative rod-shaped organism acquired by oral route. In human beings, it causes enteric fever, systemic infection and enteritis, and very rarely it causes focal infections like neck abscess, lung abscess, and bone infection [9]. Conditions associated with higher risk of *Salmonella* spp. infection are gastrectomy; achlorhydria; antacid medicine use; impaired bowel motility, which allows the bacterial entry and survival more easily; hemolytic anemia; and immunocompromise status, such as patients with diabetes mellitus, connective tissue disorders, or use of immunosuppressive agents for many different diseases. On the contrary, uncontrolled diabetes can contribute to compromise of humoral-mediated and cell-mediated immunity for *Salmonella* spp. clearance, and these might act as risk factors for the present patient [10].

Other types of neck abscesses involving *Salmonella* spp. have been described in the literature. A recent report by Luo and Liu demonstrated two cases of neck abscess and necrotizing fasciitis caused by *Salmonella enterica* serotype Enteritidis in diabetic patients [11].

Proposed mechanisms for diabetes as a risk factor for infection include decreased gastric acidity and an autonomic neuropathy of the small bowel that reduces intestinal motility and prolongs gastrointestinal transit time [9].

Conclusion

Submandibular abscess was caused by *Salmonella* spp. serotype Enteritidis in a patient with previously undiagnosed diabetes, and treated with surgical drainage and antibiotics. He completely recovered without sequelae. *Salmonella* spp. infection is a rare disease, but it should be suspected in neck abscess in patients with risk factors like diabetes or immunosuppression, which makes it possible to be successfully treated with surgical drainage and antibiotics therapy.

Acknowledgements

Organization interdepartmental meeting: HMC Craniomaxillofacial Surgery Department meeting room. Date 1 May 2017.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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