Nonpigment producing *Serratia marcescens* causing discitis following lumbar endoscopic discectomy

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Abstract

In contrary to the belief that less invasive modalities offer reasonable success rates with minimal infection complications, discitis after lumbar endoscopic discectomies occurs in 2-3% of patients. We present a rare case of post-operative discitis due to non-pigment producing *Serratia marcescens* in a female patient who had undergone single level lumbar endoscopic discectomy 6 weeks back. The patient was able to completely resume her activities 12 weeks after surgical irrigation and debridement, appropriate antibiotics and strict bed rest. Our case sheds light on a serious complication after a minimally invasive surgery by a relatively rare pathogen and highlights its clinical significance.

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INTRODUCTION

Discitis is an uncommon but a significant infection associated with lumbar endoscopic discectomies. It can be caused by either an aseptic or infectious process.

Serratia species are opportunistic Gram-negative bacteria (Tribe: Klebsielleae, Family: Enterobacteriaceae) of which
Serratia marcescens is the primary pathogenic species. [1] It can characteristically form a red pigment on colonies. Serratia generally causes health-care associated infections of the respiratory, urinary and gastrointestinal tracts. [2]

Here, we describe a rare case of discitis due to non-pigment producing S. marcescens following single level endoscopic lumbar discectomy.

**CASE REPORT**

A 40-year-old female patient presented with severe radicular pain of 6 months duration along the L3 dermatome. After 8 weeks of unsuccessful conservative management, single level lumbar endoscopic discectomy was performed for the herniated nucleus pulposus. The patient was totally relieved of symptoms and was discharged on the 3rd post-operative day.

She returned 12 weeks after surgery with complaints of severe back pain and fever. Laboratory blood examination showed C-reactive protein (CRP) to be 10 mg/dL, erythrocyte sedimentation rate (ESR) 50 mm/h and white blood cell counts 9.8 × 10^9/L, with 80% segmented neutrophils. At this point magnetic resonance imaging (MRI) was repeated, which showed the presence of fluid in the disc space and changes in the end plate that pointed towards discitis.

A computerised tomography (CT) guided biopsy [Figure 1] was performed and sent to the microbiology laboratory for culture and sensitivity. Gram stain of the sample revealed inflammatory cells with short, Gram-negative bacilli. Culture yielded pure growth of non-pigmented, circular, convex colonies on blood agar, MacConkey agar and nutrient agar [Figure 2]. Gram staining of these colonies from agar plates showed the presence of Gram-negative bacilli. The organism was motile, catalase positive, and oxidase negative. Further tests revealed that it was saccharolytic and positive for urease production. It utilised citrate and reduced nitrate to nitrite. The organism was positive for DNAse and liquefied gelatin, and negative for the fermentation of raffinose, lactose, arabinose and indole production [Figure 3] and [Figure 4]. Based on the biochemical characteristics the isolate was identified as S. marcescens.[3] It exhibited resistance to Tetracycline, Ampicillin and first and second-generation cephalosporins, and was susceptible to Trimethoprim-Sulfamethoxazole, Chloramphenicol, fluoroquinolones, aminoglycosides, third-generation cephalosporins, beta-lactam/beta-lactamase inhibitors and carbapenems.[Figure 1][Figure 2][Figure 3][Figure 4]

Surgical irrigation and debridement were done, and the patient started on intravenous (IV) Ciprofloxacin and Gentamicin and advised strict bed rest. The patient was able to resume completely her previous activities after 6 weeks of the above antibiotics followed by an additional 6 weeks of oral Ciprofloxacin.

**DISCUSSION**

Serratia marcescens infection of the patient's intervertebral disc after single level lumbar endoscopic discectomy was a rare event as no such case has been previously reported in our hospital. However, in a study by Haufe and Mork, [4] discitis after lumbar discectomy occurred in 2-3% of cases.

Serratia marcescens is an opportunistic pathogen causing a plethora of nosocomial infections in humans, but it rarely affects the bones and joints. There are also relatively few cases reported of post-operative discitis due to Serratia (two cases after elective lumbar spine surgery and one case after anterior cervical discectomy and fusion). [5],[6]

The isolate in our study, being a non-pigment producer was even more surprising. S. marcescens is well-known for the red pigmentation it produces called prodigiosin. Although it can be a distinguishing factor, it is present in only some strains. It is hypothesised that the pigment production is a tightly regulated gene product. Prodigiosin can trigger body's immune system. Therefore in order to escape detection by the host's immune system, S. marcescens living in a human body itself limits prodigiosin synthesis. Hence, many strains appear to have lost the ability to produce it at all. [7] This probably explains the absence of pigment in our case.

There is a debate as to the cause of discitis in our study.

A positive culture from the material obtained by CT biopsy, along with elevated ESR, CRP, leucocytosis, and typical changes on MRI ruled out the diagnosis of chemical discitis.
Before our patient's initial discectomy, pre-operative imaging, blood and urine tests did not indicate any infectious source in the vertebral body/intervertebral disc, blood or urine. Therefore, it is unlikely that an infection that caused the discitis was already present.

One possible cause could be contamination from skin flora. Serratia species can spread within or among health care institutions on the hands of staff. [8] It can also survive in aqueous disinfectant solutions, which can become the source for outbreaks. [9] However, strict hand hygiene and optimal aseptic techniques are maintained in our operation theatres. Furthermore, skin is prepared pre-operatively with alcohol-based povidone-iodine. Therefore, it appears to be a less likely cause.

In addition, S. marcescens is also known to contaminate and breed in normal saline solution. [5] During endoscopic discectomy, the saline that is used for constant irrigation may be the probable source of S. marcescens although this could not be proved in this case.

The antibiotics of choice in literature are: Amikacin/Gentamicin, Meropenem, and Ciprofloxacin. [2] Systemic antibiotics have been advocated to be administered by IV infusion for a minimum of 4-6 weeks, followed by oral administration for a further 2-3 months. [10] In our study, the organism was sensitive to many of the antibiotics and successfully treated with Gentamicin and Ciprofloxacin.

CONCLUSION

Serratia marcescens may become a potential pathogen causing post-operative spine infections. Maintaining a high level of suspicion, prompt diagnosis and effective management will determine the morbidity associated with the case.

References