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Case Report

Isolation of Streptococcus Thoraltensis in A Case of Necrotizing Fasciitis

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Abstract: Our aim of this case report is to add significant epidemiological knowledge regarding the role of Streptococcus *thoraltensis* in causing human infections, emphasizing the importance of not neglecting the viridans group of streptococci in non-neutropenic patients and also patients with normal cardiac valves. Objectives of our study are to present the clinical features and laboratory findings of a patient diagnosed with Necrotizing fasciitis of perineum in whom *S.thoraltesis* a viridans streptococcus species was isolated in blood culture . Necrotizing fasciitis is an uncommon bacterial infection of fascial tissue which can progress to cause necrosis followed by sepsis. In microbiological aspects Necrotizing fasciitis is classified as type I and II. Type I is due to polymicrobial infection.Type II is commonly due to group A beta hemolytic Streptococci and Staphylococcus aureus .To the best of our knowledge *Streptococcus thoraltensis* bacteremia with necrotizing fasciitis has never been reported till now. Only a few cases of *S.thoraltensis* is reported in literature so far. Here we present a case of a 65-year-old male patient admitted with sepsis and shock. He had a fever, chills for two weeks, and difficulty walking for five days. On examination, there was a scrotal swelling and a swelling of 8x4 cm over the left gluteal region near the anal canal with erythema and tenderness. The computed tomographic scan of the abdomen and pelvis was suggestive of Necrotizing Fasciitis with multiple abscess formation involving perianal region,ischiorectal fossa,root of penis, and scrotum, left anterior abdominal wall with left retroperitoneal and intraperitoneal extension. Laboratory investigations revealed marked neutrophilia and elevated urea and creatinine levels.The patient expired on the same day in spite of prompt supportive treatment. The 2 blood samples drawn from different sites were culture positive for *S. thoraltensis* . As blood culture results play a very important role in identifying the pathogen in Necrotizing fasciitis *S.thoraltensis* isolation from two blood cultures throws light on the emerging pathogenic nature of viridans group of streptococci.It emphasizes the importance of treating the viridans group of streptococci and not neglecting it in non-neutropenic patients and patients with normal cardiac valves.

Key words: Blood culture, Necrotizing fasciitis, Sepsis, Shock, *Streptococcus thoraltensis*, Vitek 2.

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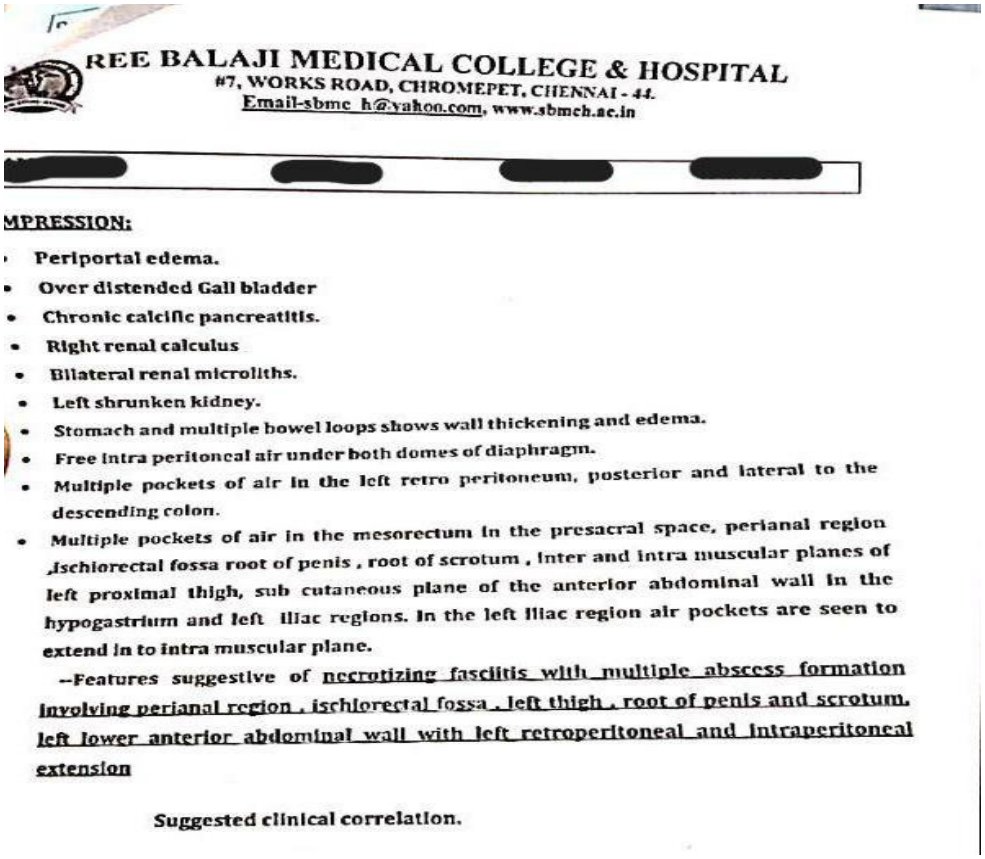
1. INTRODUCTION

This case report aims to add significant epidemiological knowledge about the role of *S.thoraltensis* in causing human infections.Also to emphasize the importance of not neglecting the viridans group of streptococci in non-neutropenic patients and patients with normal cardiac valves. The objectives are to present the clinical features and laboratory findings of a patient diagnosed with Necrotizing fasciitis of perineum in whom *S.thoraltensis* a viridans streptococcus species, was isolated in blood culture. Necrotizing fasciitis is an uncommon bacterial infection of fascial tissue which can progress to cause necrosis followed by sepsis [1]. It is defined as extensive necrosis of skin,subcutaneous tissue,fascia along with myonecrosis.[2] Since infection spreads through the fascial plane, and the superficial tissues initially seem normal.This delays the early diagnosis.[3] When the infection progresses systemic features start appearing such as fever, increase in pulse rate, and sepsis.[4] The exact incidence of Necrotizing fasciitis is not known. Still, in few countries its incidence is calculated to be 1 in 100,000 people.[5]Though the mortality rate has decreased when compared to the last century it still remains life-threatening. The mortality rate is the same as 30% for the past twenty years.[6,7] In microbiological aspect Necrotizing fasciitis is classified as type I and II . Type I is due to polymicrobial infection occurring in older patients .Type II is commonly due to group A beta hemolytic Streptococci and Staphylococcus aureus .Type II infection occurs in younger patients.[8]We would like to present a case report of an older patient with Necrotizing fasciitis in whom a viridans streptococcus species was isolated in blood culture.*Streptococcus thoraltensis* belonging to viridans streptococci which is thought to be non-pathogenic to humans was isolated in our patient.[9] *S.thoraltensis* is commonly isolated from the genital tracts of sows and intestinal tracts of pigs.[10] It is also isolated from the subgingival plaques and ,naso and oropharynx of humans as well.[11] So far only a few cases of human infections due to *Streptococcus thoraltensis* have been reported in literature and it has never been reported as a pathogen in a case of Necrotizing fasciitis so far. The viridans streptococci are known to cause bacteremia in patients with valvular diseases and are considered as a common cause of bacteremia in patients with neutropenia.[12] But our patient neither had valvular deformities nor neutropenia. Therefore, this case report adds more information to the emerging pathogenic nature of the viridans group of streptococci in non-neutropenic patients and patients with normal cardiac valves.[13] Moreover it highlights that the scarcely documented *Streptococcus thoraltensis* is not to be neglected as a non-human pathogen and implies the need for further studies to be undertaken to confirm its pathogenicity in causing various infections in humans.

2. CASE REPORT

In December 2021 we received a 65-year-old male patient in ICU at Sree Balaji Medical College and Hospital Chennai,South India. The main complaints was 2 to 3 episodes of fever per day with chills for the past two weeks and difficulty in walking due to a swelling in the perineal region for the past five days as reported by his relative. He had no history of Diabetes or Hypertension or Tuberculosis. No history of previous surgeries or any dental procedures in the near past. On examination, the patient was unconscious and febrile. His blood pressure was 90/50, the pulse rate 98/min, respiratory rate 16/min, oxygen saturation 92%, and blood sugar 82 mg /dl. There were no remarkable findings in cardiovascular and respiratory systems. Abdomen was soft with mild distention and bowel sounds were heard. He had scrotal swelling and a swelling of 8x4 cm over the left gluteal region near the anal canal with erythema and tenderness. Laboratory results showed elevated WBC count of $26x10^9$ /L with neutrophilia of 88%. Platelets were $246x10^9$/L. Hemoglobin was low 7.9 gm/dl. Packed cell volume was 23.2%. Urea and creatinine levels were 86 mg/dl and 2.4mg/dl, respectively. Computed tomography of abdomen and pelvis (Figure 1) was suggestive of necrotizing fasciitis with multiple abscess formation involving the perianal region, ischiorectal fossa, root of penis, and scrotum, left anterior abdominal wall with left retroperitoneal and intraperitoneal extension. Bilateral shrunken kidneys and bilateral renal microliths were also noted. A set of blood samples were drawn from two different sites for culture. The patient was started on empirical antibiotics to cover aerobic gram-positive cocci and gram-negative bacilli, and anaerobic organisms. Unfortunately, despite all supportive measures such as intubation and inotropic agents the patient succumbed to cardiac arrest on the same day. Both the blood cultures turned positive for gram positive cocci in pairs and chains in 48 hours. After subculturing on Blood agar plate (Figure 2), the organism was processed in VITEK 2 system. The organism was identified as *S.thoraltensis* with 99 % of probability(Figure 3). The sensitivity pattern was the same for both the isolates too. They were sensitive to Penicillin, Cefotaxime, ceftriaxone, Levofloxacin Ampicillin, Erythromycin, Clindamycin, Linezolid, Vancomycin, Tigecycline and Chloramphenicol. It was resistant to Tetracycline.



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MPRESSION:

- Periportal edema.
- Over distended Gall bladder
- Chronic calcific pancreatitis.
- Right renal calculus
- Bilateral renal microliths.
- Left shrunken kidney.
- Stomach and multiple bowel loops shows wall thickening and edema.
- Free intra peritoneal air under both domes of diaphragm.
- Multiple pockets of air in the left retro peritoneum, posterior and lateral to the descending colon.
- Multiple pockets of air in the mesorectum in the presacral space, perianal region ,ischiorectal fossa root of penis , root of scrotum , inter and intra muscular planes of left proximal thigh, sub cutaneous plane of the anterior abdominal wall in the hypogastrium and left iliac regions. In the left iliac region air pockets are seen to extend in to intra muscular plane.

--Features suggestive of necrotizing fasciitis with multiple abscess formation involving perianal region , ischiorectal fossa , left thigh , root of penis and scrotum, left lower anterior abdominal wall with left retroperitoneal and intraperitoneal extension

Suggested clinical correlation.

Fig 1: CT scan report of abdomen and pelvis

Figure 1 is the printed result of CT scan report of abdomen and pelvis of the patient showing the Impression part. Marked findings in favor of necrotizing fasciitis are the multiple abscess formation in the perianal region, ischiorectal fossa, left thigh, root of penis and scrotum. It was extended into left lower anterior abdominal wall and left retroperitoneal and intraperitoneal regions. Multiple pockets of air are also noted in presacral space, perianal region, root of penis, and scrotum. They extend into subcutaneous planes of the anterior abdominal wall and left iliac regions. In the left iliac region air pockets are seen rising to intra-muscular planes.

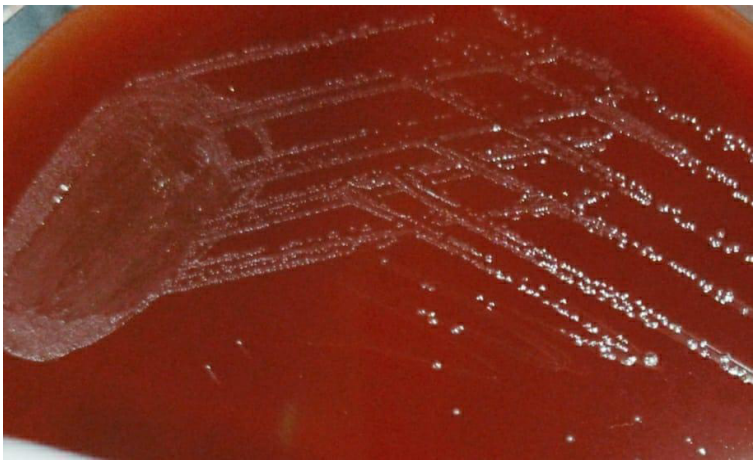

Fig 2: *Streptococcus thoraltensis* colonies on Blood agar plate

Figure 2 Two standard aerobic BacT/Alert blood culture bottles were used to inoculate the blood culture samples from two different sites. After 48 hours of incubation both the bottles turned positive for Gram positive cocci growth. As shown in the above fugure we cultured the minute to small, grey, domed, glossy, translucent smooth colonies of *S.thoraltensis* after 24 hours of incubation in 37 °c in microaerophilic environment using 5 % sheep blood agar from both BacT/Alert blood culture bottles. The viridans streptococci can be with alpha hemolysis or non hemolytic. The *S.thoraltensis* colonies we isolated were non hemolytic on blood agar. Gram stain showed gram positive cocci in pairs and chains. It was catalase negative,oxidase negative and non-motile.

Organism Quantity:
Selected Organism : Streptococcus thoraltensis
BP Infection Site:

Source: Collected:

Comments:	

Identification Information	Analysis Time:	4.82 hours	Status:	Final
Selected Organism	99% Probability Bionumber:	Streptococcus thoraltensis 151011340353571		
ID Analysis Messages				

Biochemical Details																
2	AMY	+	4	PIPLC	-	5	dXYL	-	8	ADH1	+	9	BGAL	-	11	AGLU	(+)
13	APPA	+	14	CDEX	-	15	AspA	-	16	BGAR	-	17	AMAN	-	19	PHOS	-
20	LeuA	+	23	ProA	-	24	BGURr	-	25	AGAL	+	26	PyrA	-	27	BGUR	-
28	AlaA	+	29	TyrA	+	30	dSOR	-	31	URE	-	32	POLYB	-	37	dGAL	+
38	dRIB	-	39	ILATk	-	42	LAC	-	44	NAG	+	45	dMAL	+	46	BACI	-
47	NOVO	+	50	NC6.5	-	52	dMAN	+	53	dMNE	+	54	MBdG	+	56	PUL	-
57	dRAF	+	58	O129R	-	59	SAL	+	60	SAC	+	62	dTRE	+	63	ADH2s	+
64	OPTO	+															

Fig 3: Vitek identification report of *Streptococcus thoraltensis*

Figure 3 shows the identification report of the isolated organism as *S. thoraltensis* by Vitek 2 system with wit GP ID card. It was identified with 99% probability.The analysis time taken was 4.82 hrs.The biochemical tests postive for *S.thorlatensis* in Vitek 2 were Arginine dihydrolase 1,Leucine arylamidase, Beta glucuronidase,D-galactose, Lactose,D-maltose,D-mannitol, D-mannose,Methyl-b-d-glucopyranoside, Saccharose/sucrose ,D-trehalose. The biochemical tests negative for *S. thoraltensis* were Cyclodextrin, Alpha-mannosidase,l-pyrrolydonyl-arylamidase, Urease .The tests considered as variable for *S.thoraltensis* were D-amygdalin (+) and D-sorbitol (-). Resistance to Optochin and Novobiocin is noted. No growth was observed in 6.5 % Nacl. A set of blood cultures taken from two different sites were positive for Gram positive cocci in pairs and chains and identified as *S. thoraltensis* by the Vitek 2 system.

3. DISCUSSION

S. thoraltensis was isolated from GI tract of swine in 1997.[10] In 2015 a case of maternal chorioamnionitis with *S. thoraltensis* in tracheal aspirate of newborn was reported.In this case there was occupational contact with the pigs.[14] In 2016 Dhotre et al for the first time reported *S.thoraltensis* from the subgingival plaques in humans. Till then, isolation of this rare organism was never reported in human clinical samples.[15] In 2018 Nikolaos Petridis et al first documented a case of *S.thoraltensis* bacteremia in a patient a case of fever of unknown origin for 2 months with no other associated infective pathology. In this patient, *S.thoraltensis* was isolated in 3 blood samples collected on consecutive days .[16] In 2019 it was isolated form the blood culture of a patient with postpartum pneumonia.[9] In 2020 Hai PD et al reported a *S.thoraltensis* bacteremia in a case of prosthetic valve endocarditis .Here 3 blood cultures were positive for the organism in this patient. [17] The Pubmed database reports only these few human infection cases of *S. thoraltensis*. So far none has been reported in Necrotizing fasciitis. To our knowledge, this is the first case of *S. thoraltensis* isolated from a patient with necrotising fasciitis. Necrotizing fasciitis of perianal region and perineum is known as Fournier's gangrene. It is predominantly seen in males above 50 years of age. In agreement with these known facts, our patient was a 65years old male. Fournier's gangrene markedly affects those having diabetes or chronic alcohol abuse.[18] Our patient was not a known Diabetic. Only relevant feature was he was a known alcoholic for the past 25 years. In necrotizing fasciitis most of the patients have systemic symptoms and might develop septic shock at the earliest.[19] This was true with our patient too as he was in shock while getting admitted. As the superficial findings may not reveal the deeper tissue extension the diagnosis can be difficult at the earliest.[20]In this patient on examination only swelling in the perianal region along with scrotal swelling were to be detected despite he having extensive necrotising fasciitis features internally in pelvis abdominal wall and retroperitoneal regions. The bacteria isolated in Fornier's gangrene are part of normal flora of perineum, consisting of gram positive, gram negative and anaerobic organisms.[21] Confirmation of the pathogen depends on the culture of deeper tissue specimen[22] or by blood culture results because the haematogenous spread is commonly seen[23]. In our patient the deeper tissue could not be obtained by surgery. But we collected two blood samples with one-hour interval from two different sites. Both the blood cultures were positive for *S.thoraltensis* within 48 hrs, ruling out the possibility of the organism being a contaminant. Similar to the other bacteraemia with infective endocarditis case there was a marked elevation in total WBC count and neutrophils, which adds up to the bacterial etiology of sepsis.[17] The antibiotic

sensitivity pattern was also same for both the isolates. Earlier there was a report of Vancomycin resistance in an isolate of *S.thoraltensis* from nasal cavity .[11] But the organism we isolated was resistant only to tetracycline. If the patient had seeked medical attention earlier, he could have been saved with proper antibiotic and surgical treatment and the fatal outcome of perineal necrotizing fasciitis could have been prevented.[24] Hai et al reported fatal outcome of *S.thoraltensis* associated infective endocarditis case after a course of antibiotic treatment.[17]But unfortunately we couldn't find the outcome of antibiotic treatment in our patient.In addition to that we couldn't establish the portal of entry of the S.thoraltensis in this patient.Stevens et al also agrees that the streptococcal soft tissue infections occur without a precise route of entry.[25] Hoge CW et al and Nelson GE et al .,conclude that shock due to streptococci is commonly seen in older age groups than the younger ones. This proved to be true in our case too as our patient succumbed to shock. [26,27] Viridans streptococci are known to cause bacteremia in neutropenic patients and patients with valvular abnormalities.[28,29,30]But, our patient, was not neutopenic and devoid of valvular deformities.It signifies the importance of treating the viridans group of streptococci and not neglecting it in non-neutropenic patients and patients with normal cardiac valves.

4. CONCLUSION

Though we could not establish the route of entry, isolation of *S.thoraltensis* in a case of Necrotizing fasciitis for the first time adds significant epidemiological knowledge to the already known details of the organism. Since the case we presented seems to be a scarce one, further similar cases will confirm the bacteria is a human pathogen or not. At the same time, this case report emphasizes not to neglect the viridans group of streptococci isolation in blood culture as probable contamination in non-neutropenic patients and patients without valvular deformities but to investigate thoroughly to rule out the possibility of infection.

5. AUTHORS CONTRIBUTION STATEMENT

Dr.Priya V conceived and presented the idea of the case report. Dr.Chitralekha Saikumar encouraged and supervised the work .Dr.Praveena contributed in manuscript writing.All authors participated in discussion of the case report and final manuscript presentation.

6. CONFLICT OF INTEREST

Conflict of interest declared none.

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