

Breast abscess due to *Salmonella paratyphi* A : Case reports with review of literature

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Summary

Salmonella paratyphi A causes paratyphoid fever which is characterized by acute onset of fever, abdominal pain, diarrhoea, nausea and vomiting. Localized disease can occur following both overt and silent bacteremia followed by seeding of bacteria at distant sites. *Salmonella* species though associated with abscess formation in various organs, are rarely associated with breast abscess. We report 2 cases of breast abscess due to *Salmonella enterica* serotype paratyphi A. Appropriate sampling, surgery supplemented by a comprehensive microbiological work up aided in pathogen identification and appropriate antibiotic administration for a successful outcome of these patients.

Keywords: Breast abscess, *Salmonella* species, haematogenous spread, pus, drainage

1. Introduction

Salmonellae are gram-negative bacilli and disease caused by *Salmonella* organisms can be divided into 2 categories: typhoidal and non-typhoidal. The reservoir for typhoidal disease is human, but non-typhoidal salmonellae are widely distributed among animals. In humans, nontyphoidal *Salmonella* infections are most often associated with food products; the rest is nosocomial infections or is acquired from pets (1). The aetiological agents of breast abscess are diverse, *Staphylococcus aureus* is the most common cause of breast abscess (2) (Table 1). *Salmonella* species though associated with abscess formation in various organs, are rarely associated with breast abscess. We report 2 cases of breast abscess due to *salmonella enterica* serotype paratyphi A. Drainage of the abscess followed by appropriate antibiotic treatment resulted in a good clinical outcome. We also reviewed the literature on this entity.

2. Case Reports

2.1. Case I

A 27-year-old female presented to the surgical outpatient department of AIIMS hospital in 2017 with complaints of painful lump in her left breast for 2 months duration. The patient's history revealed that the lump had started to grow in size gradually for two months. The lump was initially firm and painless, but gradually grew in size and became painful. The patient was not pregnant or lactating at that time. The patient had no other comorbidities. She was afebrile on admission, and all the vital signs were within normal limits. On local examination, the left breast was tender and swollen. A mobile, soft, fluctuating mass of around 5 × 6 cm in size located in the left lower quadrant was palpable. The overlying skin was warm and erythematous. There was no spontaneous discharge from the abscess and no lymphadenopathy. There was no nipple retraction or discharge from the nipple. Axillary lymph nodes were not palpable. Rest of physical and systemic examination was normal. Ultrasonography (USG) of the left breast revealed a heterogeneously hypoechoic deep-seated irregular collection of approximately 4.9 × 3.5 cm size. A diagnosis of breast abscess was made. The abscess was drained by USG guided aspiration and treated empirically with oral amoxicillin-clavulanic acid 625 mg 8 hourly. Her laboratory parameter revealed a total leukocyte count of 12,500/mm³, with 70% polymorphonuclear leukocytes. Pus sample was

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Table 1. Causative Organisms for Breast Abscesses (2)

Aerobic gram-positive bacteria

Staphylococci, Streptococci

Aerobic gram-negative bacteria

Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Proteus mirabilis, Salmonella spp

Anaerobic bacteria

Peptostreptococcus, Propionibacterium, Bacteroides, Lactobacillus, Eubacterium, Clostridium, Fusobacterium, Veillonella

Fungi

Candida, Cryptococcus

Other causes

Bartonella henselae, Mycobacteria, Actinomyces, Brucella

Parasites

Maggot infestation

collected and sent for microbiological investigations. Ziehl-Neelsen stain did not demonstrate acid fast bacilli (AFB) and GeneXpert was negative for *Mycobacterium tuberculosis*. Gram stain of pus showed numerous polymorphonuclear leukocytes and Gram-negative bacilli. Pus culture grew cream coloured non-hemolytic colonies on 5% sheep blood agar and nonlactose-fermenting colonies on MacConkey agar which were identified as *Salmonella enterica* paratyphi A by matrix-assisted laser desorption ionization-time of flight mass spectrometry using the bioMérieux VITEK MS system (IVD database version 2.0) (USA). The antibiotic susceptibility was determined by Kirby Bauer disk diffusion method in accordance with CLSI guidelines and the isolate was susceptible to ciprofloxacin, trimethoprim-sulfamethoxazole, erythromycin, azithromycin, chloramphenicol, ceftazidime, ceftriaxone, ampicillin and Nalidixic acid.

The patient was called back to re-evaluate the detailed history. Three months ago she had gastroenteritis which resolved without antimicrobial treatment. Stool, urine, and blood samples were obtained for culture and found negative for *Salmonella paratyphi* A spp. Widal test was also found negative. Subsequently she was treated with tablet azithromycin 1000 mg once daily for five days. The patient responded well to the treatment. The patient was cured after radiological aspiration of the abscess and antibiotic therapy. The abscess did not recur after one year of follow-up.

2.2. Case 2

A 29-year-old diabetic female presented to the surgical outpatient department of our hospital with complaints of a lump in her left breast of past 20 days duration in 2017. The patient was not pregnant or lactating at that time. Local examination revealed a lump 4.5 × 3.5 cm in left breast at 2 o'clock position free from skin and underlying muscle. The overlying skin appeared normal, with no inflammation and was non tender. There was no nipple retraction or discharge from

the nipple. Axillary lymph nodes were not palpable. Rest of general physical and systemic examination was normal. Provisional diagnosis of breast lump with a suspicion of malignancy was made and following investigations were advised: routine blood investigation, Chest x-ray, USG of both breasts, and core needle biopsy of the left breast lump. Her routine blood investigations were normal. USG of left breast revealed heterogeneously hypoechoic mass lesion of approximately 3.4 × 2.4 cm size in the left breast at 2 o'clock position. Core needle biopsy finding showed plenty of neutrophils and inflammatory cells with necrotic background suggestive of breast abscess. Lump excision with radical duct excision was done under sterile conditions. The patient was empirically started on tablet erythromycin 500 mg 6 hourly and metronidazole 400 mg BD for two weeks. The drained pus was collected and sent for microbiological investigations. Gram stain of the drained pus revealed gram-negative bacilli. The culture on blood agar grew grey-white opaque, non-hemolytic colonies and non lactose fermenting colonies on MacConkey's agar. This non-lactose fermenting gram negative bacillus was identified as *Salmonella paratyphi* A by MALDI-TOF mass spectrometry using the bioMérieux VITEK MS system (IVD database version 2.0). The antibiotic susceptibility was determined by Kirby Bauer disk diffusion method in accordance with CLSI guidelines and the isolate was susceptible to ciprofloxacin, trimethoprim-sulfamethoxazole, erythromycin, azithromycin, chloramphenicol, ceftazidime, and ceftriaxone ampicillin and nalidixic acid. On receipt of the pus culture report blood culture and widal test were advised. However, both these tests were negative. She was treated with oral ciprofloxacin 500 mg twice daily for 14 days. USG of breast done after two weeks of antibiotic therapy revealed no significant change in the heterogenous hypoechoic lesion. Left breast lumpectomy with left radical milk duct excision was done. Some pus like material was encountered which was sent to microbiology laboratory for culture and

Table 2. Showing the reports of breast abscess cases due to *Salmonella Typhi* and *Paratyphi* infections

Year	Age of Patient	Underlying condition	<i>Salmonella</i> Species	Unilateral/bilateral breast abscess	Clinical presentation	References
2016	60	Diabetes mellitus	<i>S. Typhi</i>	Unilateral	Acute	Murugesan <i>et al.</i> (10)
2016	unknown	Unknown	<i>S. Typhi</i>	Unknown	Unknown	Elumalai <i>et al.</i> (11)
2015	37	Diabetes mellitus	<i>S. paratyphi A</i>	Unilateral	Acute	Sood (5)
2014	31	Unknown	<i>S. paratyphi A</i>	Unilateral	Recurrent	Ghadage <i>et al.</i> (6)
2013	40	Unknown	<i>S. Typhi</i>	Unilateral	Acute	Banu <i>et al.</i> (12)
2012	33	Unknown	<i>S. paratyphi A</i>	Unilateral	Chronic	Siddesh <i>et al.</i> (7)
2012	60	Diabetes mellitus	<i>S. Typhi</i>	Unilateral	Acute	Kumar <i>et al.</i> (13)
2012	33	Unknown	<i>S. paratyphi A</i>	Unilateral	Recurrent	Fernando <i>et al.</i> (8)
2011	28	Unknown	<i>S. Typhi</i>	Unilateral	Acute	Vattipally <i>et al.</i> (14)
2011	29	Unknown	<i>S. Typhi</i>	Bilateral	Acute	Singh <i>et al.</i> (15)
2009	35	Unknown	<i>S. Typhi</i>	Bilateral	Acute	Singh <i>et al.</i> (16)
2007	Unknown	Immunocompromised	<i>S. Typhi</i>	Unilateral	Acute	Mahajan <i>et al.</i> (17)
2007	54	Unknown	<i>S. Typhi</i>	Unilateral	Acute	Delori <i>et al.</i> (18)
2003	40	Fibroadenoma of breast	<i>S. Typhi</i>	Unilateral	Acute	Jayakumar <i>et al.</i> (19)
1994	Unknown	Unknown	<i>S. Typhi</i>	Unknown	Unknown	Lalitha <i>et al.</i> (20)
1972	43	Unknown	<i>S. Typhi</i>	Unilateral	Chronic	Barrett <i>et al.</i> (21)
1907	16	Unknown	<i>S. Typhi</i>	Unilateral	Chronic	Thayer <i>et al.</i> (22)

Table 3. Showing the reports of breast abscess cases due to *Salmonella Paratyphi* infections (5-8)

Year	Underlying condition	Unilateral/bilateral breast abscess	Clinical presentation	Treatment
2015	Diabetes mellitus	Unilateral	Acute	Injectable Ceftriaxone/Duration unknown
2014	Unknown	Unilateral	Recurrent	Injectable cefotaxime/Duration unknown
2012	Unknown	Unilateral	Chronic	Injectable Ceftriaxone for 2 weeks
2012	Unknown	Unilateral	Recurrent	Injectable Ceftriaxone for 6 weeks
Case 1	Gastroenteritis	Unilateral	Acute	Oral azithromycin for five days
Case 2	Diabetes mellitus	Unilateral	Acute	Intravenous ceftriaxone for seven days

sensitivity. Culture again grew *Salmonella paratyphi A* with similar antimicrobial susceptibility pattern. According to the susceptibility pattern of the strain, the antibiotic regimen was rationalized intravenous ceftriaxone 2 gm 12 hourly for seven days. On follow-up there was complete resolution of abscess.

3. Discussion

Salmonella paratyphi A causes paratyphoid fever which is characterized by acute onset of fever, abdominal pain, diarrhoea, nausea and vomiting (3,4). Localized disease can occur following both overt and silent bacteremia followed by seeding of bacteria at distant sites (3). Breast abscess due to *Salmonella paratyphi* is rare complication of enteric fever. It can be attributed mainly to *Salmonella typhi* (Table 2). Till date, there are only four reports of breast abscess caused by *Salmonella paratyphi A* (Table 3) (5-8). The first case of breast abscess due to *Salmonella paratyphi A* was reported in 2012 by Fernando *et al.* in a young woman from Bangladesh (8).

We could not determine the source of *Salmonella Paratyphi A* in both cases, however our first patient gave a history of gastro-enteritis. In enteric fever, dissemination to multiple organ systems following bacteremia may lead to localized abscess formation. Although hematogenous dissemination of *Salmonella*

is a well established and the most likely mechanism of breast abscess, in the second case, this route of dissemination seemed unlikely. However, since our patient is diabetic, we speculate that impairment of cell-mediated immunity in diabetes may have impaired the ability of macrophages to kill intracellular pathogens such as *Salmonella*. Underlying condition was unknown in previously reported *Salmonella Paratyphi A* cases (5-8). Our both cases had unilateral breast abscess like other reported cases (5-8).

There are cases of recurrent breast abscess caused by *Salmonella Paratyphi A* reported in literature (6,8). However, unlike all these cases of *Salmonella Paratyphi A* breast abscess in our patient did not have any recurrence or chronicity of abscess. Kumar reported a multidrug resistant typhoid with breast abscess (9). In the present case, the *Salmonella Paratyphi A* isolate showed good susceptibility to all the drugs. However, blood culture and widal test results were negative in these patients. But the pus from breast aspirated under sonographic guidance grew the same isolate as pure growth implicating *Salmonella Paratyphi A* as the causative agent of breast abscess in this patient. The histological examination was also suggestive of breast abscess.

Due to its diverse aetiologies, it can pose a diagnostic challenge and warrants detailed evaluation. As observed in both our cases, the importance of identifying atypical

agents is that appropriate antimicrobial therapy can be instituted early.

Several line of evidence suggest that *Salmonella Paratyphi A* isolated from the patients was responsible for the breast abscess: gram stain of aspirated pus was positive for gram negative bacteria, culture of aspirated pus grew *Salmonella Paratyphi A*, direct evidence of infection was present, there was an absence of other pathogen and infection responded to treatment.

4. Conclusion

Appropriate sampling, surgery supplemented by a comprehensive microbiological work up aided in pathogen identification and appropriate antibiotic administration for a successful outcome of these patients.

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