

CASE REPORT

Early infection of bilateral Total Knee Arthroplasty with *Salmonella Typhi*. Case report and review of literature.

Abstract- Acute *Salmonella Typhi* prosthetic joint infection (PJI) is a rare event. In Endemic areas one needs to be cautious if the patient is immunocompromised. We report a case of bilateral simultaneous PJI of the knee in a 60-year-old lady who was not immunocompromised. The patient presented on Post op Day 5 with Fever and local signs suggestive of infection. As this was an Early PJI she was successfully treated with Debridement, Poly exchange and Intravenous and oral antibiotics for 6 weeks. This case highlights the fact that in patients living in these areas and in seasons where incidence of enteric fever is high, patients should be screened preoperatively for *Salmonella* infection by history and stool cultures. To our knowledge this is the first case report of Early Bilateral Simultaneous infection with *Salmonella typhi*.

Keywords: Debridement, immunocompromised, *Salmonella typhi*, prosthetic joint infection

Introduction

Periprosthetic Joint infection(PJI) is a devastating complication and can result in Amputation. *Staphylococcus Aureus* is commonest organism (1-2), PJI with salmonella species being culprit only for 0.2-1% of cases (3-4), *Salmonella* infection is common in immunocompromised patients (5-6). Other species of salmonella-like enteritis and typhimurium have been reported in such patients (7). There have been 4 prior instances of PJI (8) with salmonella typhi in the English Literature but none of them had an acute presentation. We present a rare case of early periprosthetic joint infection of bilateral total knee arthroplasty with *Salmonella typhi*. To our knowledge this is the first case of Early Bilateral Simultaneous infection with *Salmonella typhi* described so far.

Case Report: A 75 years old woman was diagnosed with severe osteoarthritis of both knee joints. Medical history was not significant. Simultaneous bilateral total knee replacement was performed. Post-operative X-rays showed normal alignment (Fig 1-3) She was mobilized on day one. Her post-operative recovery was uneventful. She was discharged from the hospital on 7th post-operative day.

34 On the 12th post-operative day she complained of severe pain in both the
35 knee joints associated with high grade intermittent fever and generalised
36 weakness. Clinically she presented a reduction in the knee range of motions on
37 both sides. The symptoms progressed. She presented to us on 15th day. On
38 examination she was febrile with tachycardia and her blood pressure was
39 120/70mm of Hg. Local aspect showed redness and warmth. Active discharge
40 was seen in the right knee surgical wound which was purulent in nature. Her
41 total White blood cells (WBC) count was 19,000/ cu-mm with increased
42 Neutrophil count of 79%. (Fig-)X-ray of both knee joints showed no signs of
43 loosening osteolysis. Preliminary culture from wound swab obtained from the
44 right knee grew moderate growth of Gram negative bacilli on culture which was
45 identified as *Salmonella* Typhi (Table 1); the isolate was sensitive to ampicillin,
46 ciprofloxacin, levofloxacin, cefotaxime, ceftriaxone, nalidixic acid and
47 cotrimoxazole.

48 Debridement, lavage and polyethylene insert exchange was done for the
49 right knee and the implants were stable. Purulent material and synovial tissue
50 were sent for microbiological examination. Purulent material was aspirated
51 from the left knee and similar procedure was done as well. Both the samples
52 grew scanty growth of *Salmonella* Typhi, the isolate had same antibiogram.
53 Further diagnostic work up was done on 5th day of admission with Widal test
54 which revealed antibody titres of up to 1: 160 dilutions and 1: 5120 dilutions for
55 O and H antigen respectively which was suggestive of acute typhoid fever. No
56 pathogenic organisms were isolated on stool and urine culture. Antibiotic
57 therapy was started with intravenous ceftriaxone for 2 weeks and oral
58 ciprofloxacin for 6 weeks immediately after the culture report was obtained.

59 Postoperatively, the patient's general condition improved. The fever had
60 subsided and pain in the knees decreased. She was mobilised and knee range of
61 motion was started. Her blood parameters returned to normalcy. She had
62 delayed wound healing which required regular dressings. Intravenous
63 ceftriaxone was administered for two weeks and oral ciprofloxacin was
64 continued for six weeks. Subsequent microbiological examination with wound
65 swab cultures (on day 10th and 13th of admission) from both knees showed no
66 growth. At 6th week, serological follow up with Widal test showed reduced
67 antibody titres to O and H antigens up to 1: 40 dilutions and 1: 320 dilutions
68 respectively. Her symptoms had considerably reduced and the surgical wound
69 showed healing with no active signs of discharge. Stool culture done on follow

70 up at 8th week was negative for *Salmonella Typhi* and antibody titres on Widal
71 test was less than 1:80 and up to 1:80 for O and H antigens respectively
72 showing decrease which was suggestive for resolution. At 2 years follow
73 up, patient was asymptomatic and her range of motion was 0-95 degrees in both
74 knees. There were no recurrences of *Salmonella Typhi* infection (fig 4 and 5).
75 She presented at 2 and half years with pain and swelling of left knee, Aspirate
76 of knee did not grow any organism -extensive work up did not reveal cause of
77 infection and was treated with two stage procedure and underwent distal
78 Femoral replacement. After 1 year of distal femoral replacement, she was
79 asymptomatic (fig 6 and 7)

80

81 Discussion:

82 Salmonella infection of TKR is a very rare event, accounting for 0.2% of
83 periprosthetic joint infections. A PubMed search reveals 44 published cases of
84 salmonella species infections out of which 32 were in the hip and 12 were in the
85 knee. The majority (43/44) was caused by non- typhoid Salmonella (NTS) and
86 only one was caused by *S. Typhi* (8). The higher incidence seen with NTS is
87 because these bacteria have a wider distribution and can manifest with
88 bacteraemia and extra intestinal manifestations (9,10). The usual presentation in
89 patients without knee replacement is reactive arthritis after enteric fever and in
90 very rare cases septic arthritis (11, 12). All the infections by Salmonella
91 reported so far presented between 4 months to 9 years after surgery (8,13,14)
92 but none had an early presentation with *S typhi*. In previously reported cases
93 with Salmonella 50 % had an underlying immunosuppressive condition (7,15)-
94 *S. typhi* is mainly acquired through orofecal contamination with Gastrointestinal
95 tract being primary focus via hematogenous spread it can go to the joints
96 (16,17). There was no reported case following direct inoculation (18). Our
97 patient did not have preoperative symptoms to suggest *S. typhi*, it is difficult to
98 say if she was carrying the bacteria, as that work up is not routinely done for
99 joint arthroplasty. Also, patient did not have sickle cell trait or any other
100 immunocompromised state (19). The only other case of Bilateral Simultaneous
101 infection with *S. typhi* was described on a..... years old patient whom
102 presented delayed infection at 10 months after surgery. And she was treated by
103 Immunomodulators (8) because of a disease (17,20,21). In absence of
104 defined protocols infection was treated with 6 weeks of antibiotics (17,20,21).
105 Incidence of typhoid burden in India was 377 per 100,000-person years of

106 typhoid (22). Pachore et al (23) have reported that infection is the second
107 commonest cause of revision knee surgery and with India being in endemic
108 zone, its more likely to encounter cases of PJI caused by S. typhi..

109

110 **Conclusion-**

111 This is a rare event and can cause considerable morbidity. Based on our
112 experience we propose that in areas where Salmonella is endemic/seasonal, one
113 should ask a detailed history to see if patient had contact with typhoid patient
114 and carry out stool cultures. If stool cultures pick up a salmonella carrier then
115 patient should be treated accordingly. This might add cost at upfront but it is
116 better to treat infection prior to surgery and avoid PJI. To the best of our
117 knowledge this is the only case report in English Literature of Early Bilateral
118 Simultaneous infection with Salmonella typhi.

119 **Consent Disclaimer:**

120 As per international standard or university standard, patient's consent has been
121 collected and preserved by the authors.

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123 **Financial support and sponsorship**

124 Nil.

125 **Conflicts of interest**

126 There are no conflicts of interest.

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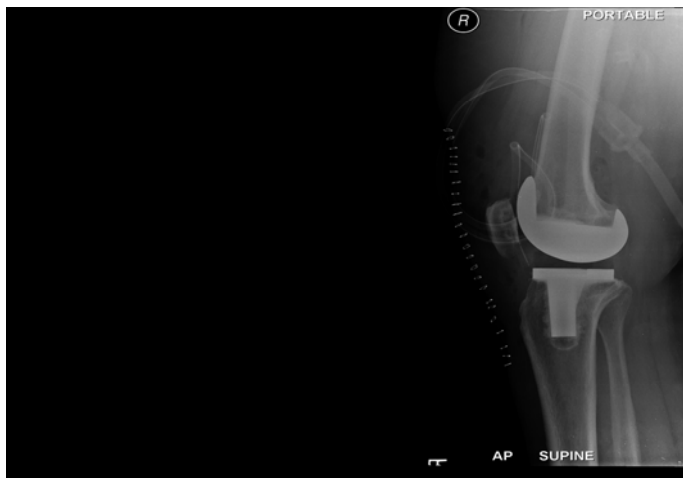
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131 Fig 1 Immediate post-operative x rays-AP View



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133 Fig 2- Immediate post-operative x rays-Lateral View

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136 Fig 3-Lateral View of left Knee

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138 **Microbiological investigations: Table 1 showing Culture results**

| DATE | TEST | SAMPLE NUMBER | LRN NUMBER | RESULT |
|------------|--------------------------|---------------|------------|---|
| 13-11-2014 | WOUND SWAB-RIGHT LEG C&S | JN-2425 | 110781 | SALMONELLA TYPHI-MODERATE GROWTH SENSITIVE- Ceftriaxone, Ciprofloxacin, Nalidixic acid, Cotrimoxazole, Cefotaxime, Ampicillin, Levofloxacin |
| 15-11-2014 | OTHERS C&S | JN-2437 | 111520 | SALMONELLA TYPHI-SCANTY GROWTH SENSITIVE- Ceftriaxone, Ciprofloxacin, Nalidixic acid, Cotrimoxazole, Cefotaxime, Ampicillin, Levofloxacin |
| | OTHERS C&S | JN-2438 | 111546 | SALMONELLA TYPHI-SCANTY GROWTH SENSITIVE- Ceftriaxone, Ciprofloxacin, Nalidixic acid, Cotrimoxazole, Cefotaxime, Ampicillin, Levofloxacin |
| 17-11-2014 | WIDAL TEST | JN-598 | 11981 | TO- 1:160 POSITIVE TH- 1:5120 POSITIVE AH -<1:20 NEGATIVE BH - <1:20 NEGATIVE |
| 20-11-2014 | STOOL C&S | JN-2487 | 113333 | NO PATHOGENIC ORGANISM ISOLATED |

| | | | | |
|------------|--------------------------|---------|--------|---|
| 22-11-2014 | WOUND SWAB | JN-2503 | 114235 | NO GROWTH |
| 25-11-2014 | WOUND SWAB- RIGHT LEG | JN-2526 | 115152 | NO GROWTH |
| | WOUND SWAB- LEFT LEG | JN-2527 | 115152 | NO GROWTH |
| 13-12-2014 | WIDAL TEST | JN-639 | 26090 | TO- 1:40 NEGATIVE TH- 1:320 POSITIVE AH - <1:20 NEGATIVE BH - <1:20 NEGATIVE |
| 12-1-2014 | STOOL C& S | JN-124 | BNR | NO PATHOGENIC ORGANISM ISOLATED |

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142 Fig.4 Knee range of movements at 12 weeks follow up.

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149 Fig.5 Healed surgical wound.

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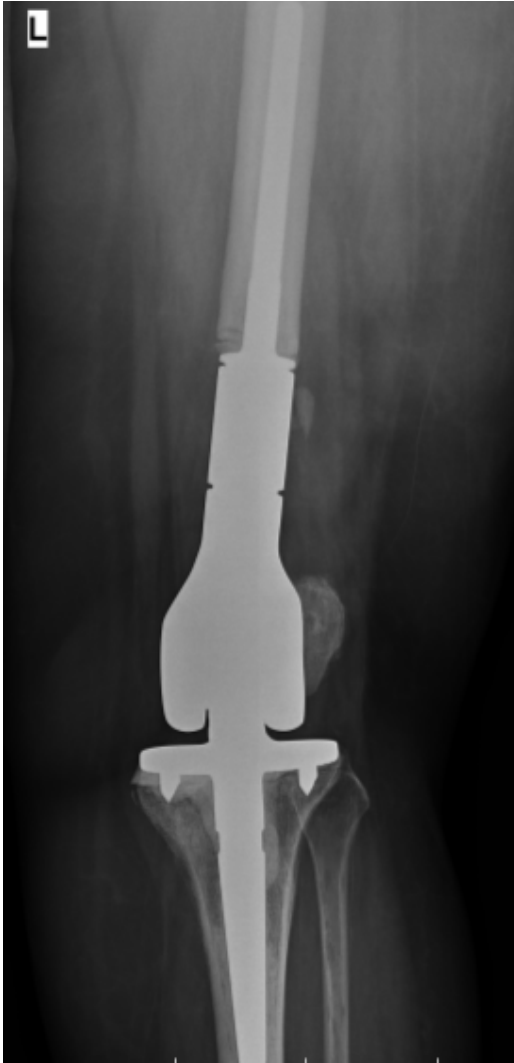
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155 Fig 6. Had episode of infection 3 years after change of poly and debridement-

156 underwent spacer placement

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160 Fig 7-Following placement of final implant

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