Infection of a prosthetic joint is uncommon in standard primary arthroplasty, occurring in 1%-2% of all cases. Recommendations for treatment differ depending on the time-course of the infection, the infecting organism, whether the implant is well-fixed, and the patient’s health.

The most common organism cultured in a septic total knee arthroplasty (TKA) or total hip arthroplasty (THA) is Staphylococcus, accounting for >50% of cases. A variety of Streptococcus species and aerobic gram-negative bacilli also make up a significant percentage. Salmonella, a gram-negative bacillus, is an uncommon pathogen in native joint septic arthritis, occurring in <2% of cases. A higher frequency of Salmonella infection occurs in patients with sickle cell disease, systemic lupus erythematosus, and other immunocompromised states.

Only 20 cases of Salmonella infection of a THA have been reported and 3 cases of TKA infection.

This article presents a case of TKA infection due to S typhimurium.

**Case Report**

A 63-year-old woman presented with progressive pain and declining function of the right knee due to osteoarthritis. Medical history revealed hypertension, gout, gastroesophageal reflux disease, and previous knee arthroscopy. Past work-up for rheumatoid arthritis was negative, and the patient was antinuclear antibody-negative. Corticosteroid use was insignificant.

Knee range of motion was 0°-95°. Routine preoperative laboratory analysis revealed a white blood cell (WBC) count of 8.3/mm³. Urinalysis was normal.

Total knee arthroplasty was performed on the right knee. Thirty minutes prior to incision, 1 g kefzol was administered. The patient had an uneventful recovery and was discharged on postoperative day 5. Over 6-week follow-up, the patient was seen twice with no complaints and full range of motion on examination.

Approximately 8 weeks postoperatively, the patient presented with fever and progressive right knee pain of 3 days’ duration that preceded an episode of nausea, vomiting, and diarrhea on day 1, which she attributed to eating pre-cooked chicken.

Initial evaluation revealed a temperature of 37.8°C. The right knee was swollen with erythema, an intact incision, 5°-85° range of motion.

**Figure 1:** AP (A) and lateral (B) radiographs of the right knee on initial presentation 54 days after primary TKA. No osteomyelitis or component loosening was noted.

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motion, and pain to knee palpation. Laboratory studies revealed a WBC count of 12.3/mm³ and erythrocyte sedimentation rate of 50 mm/h. Knee joint aspiration produced cloudy, yellow-red fluid with 37,700 nucleated cells, 97% neutrophils. Gram stain revealed 4+ WBCs, no organisms, and no crystals. A blood culture and urinalysis showed no growth. No fecal WBC count or cultures were obtained. Plain radiographs showed no osteomyelitis or component loosening (Figure 1).

The patient was admitted and placed on broad-spectrum antibiotics. Two days after presentation, the preliminary knee aspirate cultures revealed 1+ gram-negative rods, and pan-susceptible Salmonella species was identified. The final serotype was Group B S typhimurium.

Irrigation and debridement of the right TKA with polyethylene insert exchange was performed. The components were well fixed. Drainage following arthrotomy was moderate, and the fluid appeared similar to the original aspirate. Intraoperative cultures revealed the same Salmonella sp. identified from the initial aspirate.

Postoperatively, WBC count normalized, and the patient was discharged on postoperative day 7. She was treated for 6 weeks with intravenous ceftazidime 2 g every 12 hours via a long-term indwelling central venous catheter. Fecal cultures at 10 weeks revealed no Salmonella. At 10 months, erythrocyte sedimentation rate was 5 mm/h. Plain radiographs showed a well-positioned TKA without loosening (Figure 2). The patient remained pain-free and without infection at 15-month follow-up. The patient was ambulating without assistive devices, had a nonantalgic gait, and 0°-110° range of motion.

**DISCUSSION**

*Salmonella* is a food-borne pathogen usually transmitted via contaminated foul and eggs or rarely by human carriers via a fecal-oral route. Salmonellosis most commonly presents as gastroenteritis, accounting for 70% of cases and is typically caused by *S enteritidis* or *S typhimurium*. Syndromes now uncommon in the United States but prevalent in third-world countries include enteric fever (typhoid fever) and a chronic carrier state, both classically caused by *S typhi*.

*Salmonella* arthritis presents in reactive arthritis and septic arthritis. Reactive arthritis is an immune-mediated, polyarticular syndrome presenting with joint swelling and pain and culture-negative joint aspirates. Septic arthritis is an uncommon extra-intestinal manifestation of salmonellosis. Published rates of *Salmonella* arthritis in *Salmonella* infection are 0.03%-0.5%.

After analyzing data from patients with extra-intestinal *Salmonella* infections at a single institution from 1976-1984 and reviewing the antibiotic-era literature, Cohen et al concluded that patients with *Salmonella* septic arthritis generally have better outcomes compared to patients with other gram-negative joint infections.

Since the first case of *Salmonella* infection of a hip prosthesis described by Langenskiöld and Riska in 1967, reports have increased steadily. Most patients presented with fever and joint pain. Seven (29%) patients presented with an infected prosthesis within 8 weeks of surgery, whereas 4 (17%) presented between 8 weeks and 1 year, and 12 (50%) presented >1 year after joint arthroplasty.

Most patients presented with fever and joint pain. Seven (41%) of 17 cases had a prosthesis of metal-on-metal with a risk of infection. Salmonella is not considered an intraoperative contaminant during joint surgery.
Sporins, as resistance has emerged to the quinolones and third-generation cephalosporins (TMP/SMX), and more recently, fluoroquinolones, trimethoprim-sulfamethoxazole (TMP/SMX), and more recently, fluoroquinolones and third-generation cephalosporins, as resistance has emerged to the traditional antibiotics.1,10-13

In the reviewed cases, resistance to traditional antibiotics was encountered and multiple antibiotics were tried until cure or chronic suppuration was obtained. Some data suggest that ciprofloxacin is effective against stationary phase and adherent bacteria on prosthetic components whereas chronic suppression was obtained. Some studies have suggested that more effective.17

REFERENCES