Supports used for positioning of patients in hip arthroplasty: is there an infection risk?

Riaz Ahmad¹, Ji Tham¹, Syed Ghufraan Ali Naqvi¹, Umer Butt², John Dixon¹

¹Department of Orthopaedics, Weston General Hospital, Weston Super Mare, UK

²Department of Orthopaedics, Yeovil District Hospital, Yeovil, UK

ABSTRACT

INTRODUCTION Infection after joint arthroplasty is a disastrous complication. Implants used in hip arthroplasty increase the risk of infection from organisms of low pathogenicity. Potential reservoirs, that have not been assessed as yet, are the supports used for patient positioning in hip arthroplasty. The purpose of this study was to assess these supports for presence of bacterial pathogens.

SUBJECTS AND METHODS We studied 40 supports used in 20 hip arthroplasty procedures. Tryptone soya agar plates were used to sample these supports. All agar plates were incubated at 37°C for 48 h.

RESULTS Of the 20 anterior supports, 17 (85%) showed bacterial colonisation; of the 20 posterior supports, 10 (50%) had bacterial colonisation. Fourteen (52%) supports were contaminated with one organism, 9 (33%) with two organisms, three (11%) with three organisms and one (4%) with four organisms. Coagulase-negative staphylococci were the most common isolated organisms (61%) followed by coryneforms (10%) and bacilli (10%). Anterior supports had two times more colony forming units compared to the posterior supports.

CONCLUSIONS This study showed contamination of supports used for positioning patients during hip arthroplasty. It reflects poor cleaning practice and certainly raises the possibility that a high bacterial load on these supports may contribute to higher infection rates in hip arthroplasties. The study raises concerns related to contamination of supports, as there is a potential for cross-infection, wound problems, and deep sepsis around implants which could be disastrous. While colonisation does not equate with infection, we suggest thorough cleaning of the supports before and after every surgical procedure.

KEYWORDS

Arthroplasty – Organisms – Contamination – Deep sepsis

Accepted 22 October 2010; published online 18 November 2010

CORRESPONDENCE TO

Riaz Ahmad, Department of Orthopaedics, Weston General Hospital, Weston Super Mare BS23 4TQ, UK
E: riazhazi@yahoo.co.uk

Figure 1 Anterior support.

The number of total hip arthroplasties being performed is increasing year on year. As per the statistics on National Joint Registry, in year 2008, 52,104 hip arthroplasties were performed in England and Wales within NHS hospitals. Infection after total joint arthroplasty is a serious complication and the result of infection can be disastrous. Implants used in hip arthroplasty increase the risk of infection from organisms of low pathogenicity.¹

Recently, tourniquets used in total knee arthroplasty were assessed by Ahmed *et al.*,² who found colonisation of all tourniquets with one or more bacteria including methicillin-resistant *Staphylococcus aureus* (MRSA), *Pseudomonas* spp., etc. A potential reservoir, that has not been assessed as yet, are the supports used in positioning of patients in hip arthroplasty. The purpose of this study was to assess these supports for presence of bacterial pathogens.

Figure 2 Posterior support.

Subjects and Methods

Lateral decubitus position is the commonest patient position employed during hip arthroplasty. Supports are placed on the front and back to maintain this position and provide sup-

port for bony pelvis during the surgery (Figs 1 and 2). Most commercially available systems consist of an anterior support for anterior superior iliac spine or the symphysis pubis and posterior support for the sacrum. The supports in our institution are padded and stored in a basket in the anaesthetic room.

A total of 40 supports (20 anterior and 20 posterior) were used in 20 hip arthroplasty procedures. Six supports available in our theatre were sampled multiple times during the study. There were no cleaning methods in place to clean the posts between cases. We used tryptone soya agar plates for culture. Samples were taken from the padded surface of the supports; these surfaces are in contact with the patient during the surgical procedure. Microbiological sampling of the supports was done by pressing the agar plates once on the contact surface of the supports. All agar plates were incubated at 37°C for 48 h. Results were documented by bacterial type and the number of colony forming units (CFUs). Mean number of CFUs were compared between the anterior and the posterior supports.

Results

Of the 20 anterior supports, 17 (85%) showed bacterial coloni-

Table 1 Colony counts and growths

No.	Anterior support	Posterior support	Total
1	0	21 CNS	21
2	87 CNS	> 100 (> 100 CNS, 10 ASB)	>187
3	33 CNS	21 CNS	54
4	11 CNS	0	11
5	25 CNS	0	25
6	30 CNS	0	30
7	5 CNS	0	5
8	0	0	0
9	> 100 (CNS, coryneforms, 1 pseudomonas)	3 coryneforms	>103
10	0	1 Gram +ve spore-bearing bacillus	1
11	12 CNS	5 (2 coryneforms, 1 CNS, 2 micrococci)	17
12	2 (1 micrococcus, 1 CNS)	1 CNS	3
13	74 (54 CNS, 16 coryneforms, 3 micrococci, 1 bacillus)	0	74
14	6 (5 CNS, 1 Gram -ve coliform)	0	6
15	74(9CNS, 65 Coryneforms)	0	74
16	> 100 (20 bacilli, 200 CNS)	38 (12 bacilli, 26 CNS)	>138
17	200 CNS	0	200
18	23 (21 CNS, 1 bacillus, 1 micrococcus)	2 (1 coryneform, 1 <i>Streptococcus viridans</i>)	25
19	10 (9 CNS, 1 enterococcus)	0	10
20	> 200 CNS	60 (3 bacilli, 57 CNS)	> 260
Total	> 992	> 252	> 1244

CNS, coagulase-negative staphylococci; ASB, aerobic spore bearers.

sation; of the 20 posterior supports, 10 (50%) had bacterial colonisation. Of these contaminated supports, 14 (52%) were contaminated with one organism, 9 (33%) were contaminated with two organisms, three (11%) with three organisms and one (4%) with four organisms (Table 1).

Coagulase-negative staphylococci were the most common isolated organisms (61%) followed by coryneforms (10%) and bacilli (10%). Four supports were extensively contaminated to an extent that an exact number of CFUs was impossible. These counts were labelled as > 100 or > 200. The mean number of CFUs on the anterior supports was 58 compared to 25 on the posterior supports. Anterior supports thus had more than twice more CFUs compared to the posterior supports (Table 1).

There were no infections during the trial period; thus, correlation of infection with the organisms found on the supports was not possible.

Discussion

There have been studies to show that orthopaedic surgical site infection is responsible for increase in hospital stay, increase in re-hospitalisation rates, and increase in healthcare costs.⁵

This study showed contamination of supports used in positioning of patients during hip arthroplasty. It reflects poor cleaning practice and certainly raises the possibility that a high bacterial load on these supports may contribute to higher infection rate in hip arthroplasties. Both anterior and the posterior supports routinely lie very close to the proximal extent of incision made in different surgical approaches for hip arthroplasty surgery. Using colonised supports raises the possibility of transmission of pathogenic organisms to the patients immediately before surgery, thus increasing the risk of surgical site infection. Direct inoculation from the skin adjacent to the incision is one of the major causes of deep-seated postoperative sepsis.⁴

Coagulase-negative *Staphylococcus* was the commonest organism isolated in our study. It is the commonest cause of joint infection in knee replacement surgery.^{5,6} This organism has also been found to be the predominant organism in infection following total hip arthroplasty.⁷ It has also been found to be the commonest source of intra-operative bacterial contamination in operations for primary hip and knee replacements.⁸ *Pseudomonas* spp. have been isolated from superficial wound infection following total hip replacement.⁹ *Enterococcus* spp. have more frequently been recognised as a cause of super infection in the surgical patient.¹⁰

We also found that anterior supports were more contaminated than the posterior supports. This is most probably due to closer proximity of the anterior supports to the perineum, which is a 'hot-bed' of bacteria.

Our study raises concerns related to contamination of

supports as there is a potential for cross-infection, wound problems, and deep sepsis around implants which could be disastrous. Presence of foreign material, such as the femoral and acetabular implants results in a 6-fold reduction in the number of inoculates needed to cause infection.¹¹

Exclusion of supports from the operative field by surgical draping does not preclude them from being implicated in surgical site infection. The commonly used disposable non-woven drapes, although resistant to bacterial penetration, have been found to be penetrable to bacteria after 90 min.¹²

Conclusions

We have shown contamination of supports used in hip arthroplasty. While colonisation does not equate with infection, we suggest thorough cleaning of these supports before and after every surgical procedure using disinfectant wipes that are widely available in theatres.

Acknowledgements

The authors thank Drs Ibrahim (Consultant Microbiologist) and David Lewis (Senior Microbiology Technician) at the Weston General Hospital Microbiology Department for their assistance in this study.

References

1. Nelson JP, Glassburn Jr AR, Talbott RD, McElhinney JP. Clean room operating rooms. *Clin Orthop* 1973; **96**: 179–87.
2. Ahmed SM, Ahmad R, Case R, Spencer RF. A study of microbial colonisation of orthopaedic tourniquets. *Ann R Coll Surg Engl* 2009; **91**: 131–4.
3. Whitehouse JD, Friedman ND, Kirkland KB, Richardson WJ, Sexton DJ. The impact of surgical-site infections following orthopedic surgery at a community hospital and a university hospital: adverse quality of life, excess length of stay, and extra cost. *Infect Control Hosp Epidemiol* 2002; **23**: 183–9.
4. Ritter MA. Operating room environment. *Clin Orthop* 1999; **369**: 103–9.
5. Phillips JE, Crane TP, Noy M, Elliott TS, Grimer RJ. The incidence of deep prosthetic infections in a specialist orthopaedic hospital: a 15-year prospective survey. *J Bone Joint Surg Br* 2006; **88**: 943–8.
6. Fulkerson E, Valle CJ, Wise B, Walsh M, Preston C, Di Cesare PE. Antibiotic susceptibility of bacteria infecting total joint arthroplasty sites. *J Bone Joint Surg Am* 2006; **88**: 1231–7.
7. Rafiq I, Gambhir AK, Wroblewski BM, Kay PR. The microbiology of infected hip arthroplasty. *Int Orthop* 2006; **30**: 532–5.
8. Davis N, Curry A, Gambhir AK, Panigrahi H, Walker CR, Wilkins EG *et al.* Intraoperative bacterial contamination in operations for joint replacement. *J Bone Joint Surg Br* 1999; **81**: 886–9.
9. Nehrer S, Thallhammer F, Schwameis E, Breyer S, Kotz R. Teicoplanin in the prevention of infection in total hip replacement. *Arch Orthop Trauma Surg* 1998; **118**: 32–6.
10. Low DE, Willey BM, McGeer AJ. Multidrug-resistant enterococci: a threat to the surgical patient. *Am J Surg* 1995; **169** (Suppl): 8S–12S.
11. Lidwell OM, Lowbury EJ, Whyte W, Blowers R, Stanley SJ, Lowe D. Airborne contamination of wounds in joint replacement operations: the relationship to sepsis rates. *J Hosp Infect* 1983; **4**: 111–31.
12. Blom AW, Barnett A, Ajitsaria P, Noel A, Estela CM. Resistance of disposable drapes to bacterial penetration. *J Orthop Surg* 2007; **15**: 267–9.