Minimizing Infection Risk: Fortune Favors the Prepared Mind

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Abstract

Despite advances in care, infection in total joint arthroplasty remains a serious problem that has yet to be solved. Reported infection rates range from <0.5% in highly specialized centers to a high of 2% as reported at a national level. The epidemiology of total joint arthroplasty remains challenging because of the relatively low, but significant, incidence of infection. Still, there are variables that can be addressed that have demonstrated evidence regarding reduction in infection rates. These variables include optimizing medical conditions in the preoperative period such as anemia, blood glucose, and nutrition. In the perioperative period, administration of parenteral antibiotics within 1 hour of incision is a must. The effect of the operating room environment is less clear, but it is evident that traffic flow in the operating room has a negative effect on infection rates. Skin preparation with chlorhexidine is now the agent of choice, and evidence exists that iodophor impregnated occlusive dressings add value. Razors should not be used. Surgical staples for closure have an increased risk of superficial infection as compared to subcuticular sutures. In the postoperative period, early, persistent wound drainage should be managed aggressively. There is no evidence to support the use of parenteral antibiotics past 24 hours in routine cases. Patients should be advised about prophylaxis for infection when undergoing dental work and other high-risk procedures. There is a strong movement to extend this prophylactic period indefinitely, as opposed to 2 years postoperatively. Finally, and perhaps most importantly, it is the surgeon’s responsibility to be aware of all these issues and to strongly advocate for patient safety in ensuring that infection risk is minimized.
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one of the most devastating complications after a successful total joint arthroplasty is a deep infection. The implications for the patient, surgeon, and ultimately society are significant, and every effort must be made to minimize the risk of acquiring a prosthetic infection. Some specialized arthroplasty centers have reported infection rates <0.5%; however, national level data consistently reports rates near 2%, with an overall revision burden for infection of approximately 10%.1-8 Several variables appear to be important to preventing total joint arthroplasty infections, but determining which are significant can be difficult. The main difficulty relates to low-incidence events that are complicated by evolving pathogens with different management techniques over the world. As a result, studies require large data sets from specialized centers or joint replacement registries.

When looking at factors that prevent the development of total joint arthroplasty infections, it is important to establish who is responsible. It is clear that the primary responsibility rests with the surgeon. The surgeon must advocate on behalf of the patient, surgeon, and ultimately society to obtain better use of occlusive dressings. Furthermore, if one is going to remove any hair, only clippers should be used and clipping should be performed outside of the operating room.17

It is well known that preoperative antibiotics will decrease total joint arthroplasty infections, and a recent systematic review demonstrated an 81% relative risk reduction with the use of preoperative antibiotics.13 The standard antibiotics of choice are the cephalosporins such as cefazolin, which have excellent coverage of the typical bacteria causing most total joint arthroplasty infections. It is important to be aware of the volume patient distribution, and the dosing of cefazolin is 1 g for those <80 kg and 2 g for those >80 kg.14 Furthermore, for procedures that will entail a large amount of blood loss or last longer than 2 hours, a second dose of cefazolin should be considered.15 In the event that the patient is allergic to penicillin, clindamycin or vancomycin may be given. Vancomycin can be difficult to use because it must be given slowly over a longer period. The timing of antibiotics administration is important, and they should be given within 1 hour of the incision being made.14 Ideally, this should be incorporated into surgical preoperative checklists prior to the start of surgical procedures to improve patient safety.16

Some controversy exists with regard to the practice of hair removal preoperatively. The main reason to remove hair is to obtain better use of occlusive dressings. Furthermore, if one is going to remove any hair, only clippers should be used and clipping should be performed outside of the operating room.17

Once the patient is in the operating room, there is much variability in the prepping and draping of the patient for surgery. This is an important step in preventing infection, and the evidence suggests that a chlorhexidine preparation is able to lower the bacterial skin counts in foot and ankle surgery.18,19 The use of occlusive drapes is also commonly used with total joint arthroplasty, and evidence exists that the combination of a rapidly evaporating prep solution with occlusive drapes will prevent wound contamination.20

Other intraoperative factors important to decreasing bacterial counts are to limit the number of people in the operating theaters as well as the time that sterile setups are exposed to the environment.21 This may be reflected in the evidence that supports a lower risk of infection with shorter duration of surgery.22 Evidence exists for the use of body exhaust suits and laminar airflow to limit the bacterial shedding from operating room staff that could contaminate the surgical wound and implants.23 The evidence for surgical gloves suggests that double gloving will reduce the risk of perforations and exposure of the patient to the bacterial flora of the surgeon’s hands.24 There is solid evidence that the use of antibiotic impregnated cement in total joint arthroplasty lowers the risk of infection.25 Surgical staples for wound closure have been shown to increase the risk of superficial infections in hip arthroplasty, compared to subcuticular closure.26

After the surgical procedure, careful patient management will also aid in infection prevention. There is little support for the use of prophylactic antibiotics beyond 24 hours.14 Debate exists as to the duration of use of prophylactic antibiotics for other procedures that might cause a bacteremia in a total joint arthroplasty patient, such as dental work.1,11 The recommendations for antibiotic prophylaxis range from 2 years after total joint arthroplasty to indefinitely. The aggressive management and prevention of wound drainage has been recommended to reduce the risk of total joint arthroplasty infection.27 The issue of blood transfusion has become important for many reasons, but allogeneic blood
transfusions have been shown to increase the risk of deep infection. 4

Prevention of total joint arthroplasty infections requires a systematic institution-wide approach. The surgeon must be continually on guard against apathy and laxity, both personally and in co-workers, toward sterility technique and infection risk reduction.

REFERENCES


