

## The effectiveness of antibiotic-loaded bone cement for preventing postoperative infection in patients undergoing total knee arthroplasty

Shu-Hui Wen

*Tzu-Chi University, Taiwan*

The study question focuses on the effectiveness of antibiotic-loaded bone cement (ALBC) for preventing postoperative infection in patients undergoing total knee arthroplasty (TKA). Infection has remained being a rare but serious complication after TKA. However, the utilization of ALBC for reducing the occurrence of infection is debated. We used the National Inpatient Database, which was provided by National Health Research Institutes. We included 16,108 TKA adult patients between January and November, 2012. There were 5,605 patients (34.8%) using ALBC. The postoperative 30-day infection and acute kidney failure were compared. We adopted multi-level logistic regression models to regulate for potential confounding factors considerably of hospital levels (including medical centers, metropolitan hospitals, and native community hospitals). The odds ratio (OR) of the infection in ALBC use group and 95% confidence interval (CI) were estimated. The main compositions of ALBC are vancomycin (71.7%), followed by gentamicin (30.7%), and cefuroxime (12.4%). Among patients with ALBC use, 83.8% patient had one sort of antibiotics, nevertheless 16.0% patients had two combined antibiotics. We found that the utilization of ALBC couldn't reduce the postoperative 30-day infection. When conducting multi-level logistic regression model, there remained no favorable effect of ALBC in reducing postoperative infection (OR= 0.80, 95% CI: 0.50-1.26,  $p= 0.329$ ). For risk of acute kidney failure for ALBC users, the sample size ( $n=7$ ) is just too small to evaluate. In conclusion, there was no significant advantage of ALBC in reducing postoperative 30-day infection in patients undergoing TKA. During the past 20 years, antibiotic-loaded hip and knee spacers became a well-liked method of managing such infections with reported success rates of > 90% 2-3. Complications are rather infrequent and consist mostly of mechanical (spacer fracture, dislocation, bone fracture) and people associated with the antibiotic impregnation of bone cement (reinfection/infection persistence, systemic side effects such as renal or hepatic failure, allergic reactions). The release of the antibiotic from the cement is influenced by the type (viscosity) of

the cement, by the surface of contact/exchange, by the conditions of the compound, and the type and amount of antibiotic. The antibiotic is released from the surface of the cement and from cracks and voids in the cement itself. The nature of the polymer allows the passage of fluids, allowing the discharge of the incorporated antibiotic. Nevertheless, while the hydrophobicity of the cement limits this release at less than the 10%, most of the antibiotic is released within the first hours and days after surgery. In addition, a significant amount should be trapped in cement for a while. At the time of the preparation, when mixed, it becomes a viscous material paste, which solidifies very quickly by an exothermic reaction. It acts as a fixation between the prosthetic components and the cancellous bone. During the mixing, pores of various sizes are produced as consequence of the reaction and volume variations. These microholes may represent the beginning point of cracks and thus are often responsible of the premature failure of the cement. To avoid the formation of those pores, it's possible to organize the cement under vacuum conditions.