Novel post-cam endoskeleton-reinforced posterior-stabilized cement articulating spacer reduced the rate of mechanical complications in prosthetic knee infection

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INTRODUCTION:
Posterior-stabilized cement articulating spacers (PS spacers) have superior knee scores and a greater range of motion in a two-stage exchange for chronic prosthetic knee infections (PKIs); however, mechanical complications are associated with the use of PS spacers. In the present study, we investigated a novel post-cam endoskeleton-reinforced PS spacer and its outcomes.

METHODS:
This single-surgeon retrospective cohort study included patients with chronic PKIs treated with PS spacers between 2015 and 2022. PS spacers with three different configurations, based on endoskeleton reinforcement, were compared: non-reinforced (n-PS), cam-reinforced alone (C-PS), and post- and cam-reinforced (PC-PS). Rates of mechanical complications, reoperation, and infection eradication were evaluated. The constraint choice of the revision prosthesis and risk factors for mechanical complications were analyzed.
RESULTS:
A total of **186 patients** were included, with **75 using n-PS**, **61 using C-PS**, and **50 using PC-PS spacers**, and a mean follow-up of **55.3 months**. Table 1 compares demographic differences, noting a significant variation in follow-up duration. Table 2 shows outcomes for each spacer type, with overall complication rates of **20%** for n-PS, **19.7%** for C-PS, and **0%** for PC-PS. The spacer exchange rate was lowest for **PC-PS (0%)** compared to n-PS (**16%**) and C-PS (**13%**). Table 3 outlines mechanical complications for n-PS and C-PS, most of which were non-traumatic and occurred within 6 weeks. Table 4 highlighting **BMI ≥ 25**, **small femoral spacer size**, and **high flexion** as significant risks.
DISCUSSION AND CONCLUSION:
This **retrospective cohort study** compared the mechanical outcomes of different **PS spacers** with varying **endoskeleton reinforcements** and identified **risk factors for failure**. All spacers controlled infections, but the **PC-PS spacer** showed no mechanical complications, reoperations, or need for high-constraint revision prostheses.
The **post-cam design** of spacers stabilizes the knee during flexion and increases range of motion but also introduces mechanical stress. **n-PS spacers** experienced cam fractures, likely due to smaller cement cam volume and weakened cement from antibiotics. **C-PS spacers** prevented cam fractures with metal reinforcement but caused tibial post fractures and dislodgements due to the unreinforced cement post's inability to withstand forces in deep flexion.
PC-PS spacers addressed these weaknesses with **metal screw reinforcement**, preventing all mechanical failures and acting as both an **endoskeleton** and "locking screw."
Risk factors for mechanical complications included **high BMI**, smaller femoral spacer size, greater knee flexion (especially >130°), and squared post designs. **n-PS** and **C-PS spacers** required reoperations or early reimplantation, while **PC-PS spacers** avoided these issues by using **constrained condylar knees (CCK)**, reducing stem-tip stress and loosening.
The study had limitations, including its **retrospective nature** and lack of **biomechanical testing**. However, it provides strong evidence that **wire and screw reinforcement** improves mechanical outcomes and reduces reoperation risk. The study recommends using **PC-PS spacers** for two-stage exchanges in chronic PKI, particularly in patients with **high BMI**, **small femoral spacer size**, and **high knee flexion**.