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Commentary

Is it time to stop giving antibiotic prophylaxis to prosthetic joint patients?

Abbreviations

AAOS American Association of Orthopaedic Surgeons

ADA American Dental Association

AP Antibiotic prophylaxis

IDP Invasive dental procedures

LPJI Late prosthetic joint infection

Background

Prosthetic joints are one of the great advances of modern medicine. They improve patients' quality of life by providing pain relief, mobility, and independence. There are already >7 million people with prosthetic joints in the US,[1] and this number is increasing rapidly. By the 1970s-80s, orthopaedic surgeons began to call for dentists to give antibiotic prophylaxis (AP) to patients with prosthetic joints undergoing invasive dental procedures (IDP). In 1988, the American Dental Association (ADA) sponsored a workshop which concluded that scientific data were inadequate to support the need for or effectiveness of AP and that the decision to use or not use AP should be up to the dentist's clinical judgement in consultation with the orthopaedist.[2] In 1997, and again in 2003 the ADA and AAOS published agreed upon guidelines, but in 2009 the AAOS put out a "Patient Safety Committee Opinion Statement" that essentially reverted back to the pre-1997 practice of covering all prosthetic joints for the lifetime of the patient. Despite multiple attempts by the ADA and American Association of Orthopaedic Surgeons (AAOS) since 1995 to resolve the issues of whether IDP predispose patients to late prosthetic joint infection (LPJI), and if AP is effective and safe in preventing LPJI, these issues are still not resolved.[3-5]

What's New

A recent study has provided strong evidence that IDP do not predispose patients to subsequent LPJI.[6] This study included all 9,427 LPJI hospital admissions in England over a 6-year period, for whom dental records were available. This was more than 30 times larger than any previous study and had more than sufficient statistical power to detect any clinically significant association between IDP and LPJI. Furthermore, the confounding caused by AP use in previously investigated populations was avoided by using the population of England and Wales (58,000,000 people), where use of AP to prevent LPJI has never been advocated. This study showed that there were fewer IDP in the 3-months before LPJI (incidence rate ratio = 0.89, 95% confidence interval 0.82 to 0.96, p=0.002) than in the preceding 12-months.

What We Know

- Prosthetic joint infections are devastating. In many cases, the infection cannot be eliminated with antibiotics alone and the infected prosthesis must be removed. In some cases, a replacement prosthesis must wait until the infection is resolved following a long-term period of IV and oral antibiotics. In some cases, replacement may not be an option,

and in rare cases these infections can lead to limb amputation or death. Additionally, the economic, societal, and personal costs of LPJI are substantial.

- Although the vast majority of joint replacements are successful, LPJI remains an important cause of arthroplasty failure.
- Although uncommon, LPJI are most likely to result from hematogenous spread of infection from one or other distant source. However, oral bacteria account for a very small proportion of LPJI, likely <5%).
- Other, non-oral bacteria, particularly Staphylococci, account for the vast majority of LPJI.
- Oral bacteria not only enter the circulation during IDP, but also during routine daily activities such as tooth brushing.[7] The frequency for oral bacteremia from the mouth is influenced by an individual's oral hygiene status and gingival health, that is, those with lower levels of dental calculus and plaque are less likely to experience bacteremia following routine daily activities.[8]
- For AP to be effective, a causal relationship must exist between IDP and LPJI, and currently data to support this are lacking.[6]
- Complications can occur with the administration of AP for prosthetic joint patients and include: 1) the risk of adverse drug reactions;[9] 2) the unnecessary use of antibiotics can lead to antibiotic resistance and loss of antibiotic effectiveness; and 3) significant cost burden for patients and healthcare systems.
- In the US, dentists are under pressure to provide AP before IDP to prevent LPJI. However, because of the lack of evidence for a causal association, the small incidence of LPJI caused by oral bacteria and the costs and risks associated with AP, orthopaedic surgeons in many other countries do not recommend AP for patients undergoing IDP.* Moreover, there is no evidence that LPJI incidence is any higher in the countries where AP is not recommended.

What We Think We Know

- In the absence of a positive association between IDP and subsequent LPJI, there is no rationale for providing AP.

- There is the potential for hundreds of oral bacteremia bouts annually related to activities of daily living in people with poor oral hygiene, which likely poses a far greater risk for the very small number of oral bacteria related LPJI than the occasional IDP. [7]
- Poor oral hygiene and gingival disease should be considered risk factors for LPJI, just as other well-recognized risk factors are, for example, obesity, diabetes mellitus, immunocompromise, and rheumatoid arthritis[1].

What We Don't Know

- Are IDP or routine daily activities more responsible for the small number of oral bacteria related LPJI?
- Does AP before IDP prevent LPJI? If so, to what degree?
- Does the risk of routine AP prior to IDP for those with prosthetic joints outweigh the risk adverse reactions and the overuse of antibiotics to the individual and society?

Where Do We Go from Here?

In light of this new scientific evidence which supports data from previous studies and systematic reviews,[5, 10] it may be time for a committee representing the ADA and the AAOS to review the scientific literature concerning IDP and risk for LPJI and develop agreed upon guidelines, as was done in 1997 and 2003. This group might also refocus the effort to reduce the incidence of LPJI on a potential association between bacteremia from poor oral hygiene as a cause of the small percentage of cases of LPJI from the oral cavity.

Conclusions

These new data suggest there is no rationale for patients with prosthetic joints to receive AP before IDP. The critical need to focus on antibiotic stewardship dictates a re-appraisal of guidelines on AP use for IDP in people with prosthetic joints.

*Examples of countries that do not recommend AP before IDP for patients with prosthetic joints include Australia, Brazil, Canada, Denmark, France, Netherlands, Norway, Portugal, and United Kingdom (England, Scotland, Wales, Northern Ireland).

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