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Evaluating Dental Clearance Prior to Total Joint Replacement at the Philadelphia Veterans Affairs Medical Center: One Answer, Ten More Questions

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Introduction

Periprosthetic infection is a dreaded complication of total joint replacement, and surgeons should take all reasonable steps to avoid it. One possible source of infection is periodontal bacteria. Because of this possible association, some surgeons maintain that all patients should be evaluated and treated for periodontal disease and tooth decay before undergoing arthroplasty—so-called “dental clearance.”

The practice of dental clearance is somewhat controversial, as the prevalence of periodontal disease and significant tooth decay might be too low to justify it. As noted in a recent review, “dental disease has long been anecdotally associated with increased periprosthetic joint infections, although case-control studies do not support this relationship.”¹

At the Philadelphia Veterans Affairs (VA) Medical Center, dental clearance has traditionally been part of the routine preoperative checklist. Still, requiring dental clearance has been complicated by the fact that many veterans are not eligible for full dental services. As such, clearance is performed on an *ad hoc* basis and surgery is not scheduled until clearance can be obtained.

We therefore sought to determine whether a more formal system is needed, by measuring the yield of these examinations: namely, the rate of discovering pathology. Our working hypothesis was that the yield from such examinations would be sufficiently high to justify their continuance.

Methods

A list of patients who underwent total knee or total hip arthroplasty in the calendar year 2019 was generated. The patient record for all such patients was then examined to determine the outcome of the dental clearance examination.

Notably, patients who had a dentist outside of the VA health system (“private dentists”) were allowed to obtain clearance from their outside practitioner.

Patients were thus characterized as follows:

- Edentulous (those with no teeth were not subject to further screening)
- Cleared by VA dentist
- Periodontal disease/significant tooth decay discovered by VA dentist
- Non-periodontal disease discovered by VA dentist
- Ultimately cleared by private dentist (this includes both “no disease” and “disease treated by private dentist”)

Results

There were 151 patients who underwent total knee or total hip arthroplasty in 2019. There were 43 patients ultimately cleared by their private dentist and 25 who had no teeth, leaving 83 patients to be locally evaluated by VA dentists.

Of these, 44 were cleared and 39 failed—38 with periodontal disease or significant tooth decay and one with leukoplakia.

Discussion

We discovered a staggeringly high rate of periodontal disease within our VA cohort. Excluding those who went to a private dentist or who were exempt from clearance because they had no teeth, 47% of patients failed their dental clearance examination. By contrast, a study conducted by Tokarski et al. in our same city and using similar methodology found that only 35 out of 300 patients (11.6%) failed.² (The chi-square statistic for this 35/300 vs. 39/83 discrepancy is 52.03; the associated p-value is <0.00001.)

Even if the 43 patients examined by their private dentist were folded back into our calculations (contributing an additional 5 positives and 38 negatives, as implied by the 11.6% prevalence rate found by the Tokarski et al. study), the resulting failure rate, 35%, is still higher than the failure rate reported by any study of the general population.

As a practical matter, the results of our pilot study confirm the need for continued dental clearance at our medical center. If nothing else, requiring dental clearance prior to total joint replacement and addressing dental problems preoperatively should reduce the need for dental procedures in the immediate aftermath of surgery. Given that transient bacteremia is associated with dental procedures and that there is persistent localized hyperemia around replaced joints, avoiding dental procedures in the first few years after surgery should minimize the risk of periprosthetic infection.

Further, while the results of a single year's cohort at a single institution are hardly definitive, they do serve as a springboard to further investigation. We propose that there are at least ten questions still unanswered by the results presented here:

1. Is there a more efficient way to screen for dental clearance outside of requiring all patients to see a dentist preoperatively?

It may be possible to identify low-risk patients through a series of questions, such that not all patients are required to see a dentist prior to surgery. For example, patients who avoid tobacco, visit their dentist regularly, and report no pain or sensitivity when chewing are less likely to have clinically significant periodontal disease and tooth decay. However, the specific questions needed to reliably identify low-risk patients (akin to the Ottawa Ankle Rules to obviate the need for radiographs in the Emergency Room) are yet to be defined.

2. Are the risks of periodontal disease and tooth decay fully mitigated by screening and treatment?

It is reasonable to assume that dental clearance reduces the risk of periprosthetic infection caused by oral disease. However, it is not known whether the overall infection rate (or more broadly, the overall complication rate) is markedly lower. For one, periodontal disease and tooth decay may reflect medical comorbidities, such as diabetes, that themselves pose significant postoperative risk. For another, longstanding periodontal disease may induce chronic low grade inflammation whose harmful effects are not mitigated completely by cleaning the mouth. Moreover, if any teeth are retained, the very processes that led to periodontal disease and tooth decay in the first place may affect these remaining teeth in the future. Finally, the presence of periodontal disease and tooth decay may reflect poor hygiene habits that will affect a total joint replacement. As such, we would be hesitant to operate on a patient who will not "take care" of his or her prosthesis, and periodontal disease and tooth decay may be a marker for this issue.

3. How do edentulous patients compare to the others?

The standard protocol, by which edentulous patients are *per se* cleared, assumes that "no teeth = no periodontal disease or tooth decay." The logic is simple: missing teeth cannot be diseased. However, if oral disease does indeed reflect comorbidities or behavioral/socioeconomic confounders, then removing teeth will no more reduce the risks of oral disease

than abdominal liposuction will reduce the cardiac risks of belly fat.³ In both cases, only the marker, not the underlying process, is being addressed. Whether edentulous patients should be considered in the "cleared" category or more aptly in the "treated periodontal disease and tooth decay" category is not known. A study of edentulous patients' outcomes might elucidate the role of active versus prior oral disease as a risk factor.

4. If the rate of periodontal disease is so much higher among veterans, does this suggest that veterans are so different from the general population that veteran outcome studies cannot inform general policies?

In 2002, a now classic paper by Moseley et al. studied the use of arthroscopy for arthritis and found that "sham surgery" was equally effective.⁴ The pushback from orthopaedic surgeons was harsh.⁵ A common form of rebuttal can be paraphrased as "well, that study was done at the VA." While that comment is factually accurate, what might be questioned is the implication. Namely, "well, that study was done at the VA and the patients there are so different that VA results have no meaning outside of the VA system." It is known that the veterans who seek care at the VA are more likely to be male, with greater comorbid conditions, a higher prevalence of smoking, and a lower socioeconomic status.⁶ Outcomes studies explicitly account for these known confounders. At the very least, if the prevalence of periodontal disease is much higher among veterans, future VA outcomes studies (on any topic) might have to control for this variable as well.

5. What are the true costs of dental evaluation and treatment?

As noted, dental clearance at our medical center is performed on an *ad hoc* basis. Patients are sent out for clearance and treatment [see below] without formal budgetary authority. In order to obtain the formal authority to continue dental clearance officially, it would be necessary to document the costs and benefits. We know that nearly half of our patient cohort needs local clearance, and that within that cohort, nearly half fail their examination. What we do not know is the cost of getting those failed patients ready for surgery and the benefits of complications avoided. Although it would be ethically impermissible to conduct a randomized controlled trial in which some patients are not sent for clearance—a method that would define costs and benefits precisely—simple models can be created to estimate the number of periprosthetic infections that can be avoided with each clearance. With that, some estimate of the dollars saved by a clearance program can be estimated.

6. Is it possible to reduce the prevalence of periodontal disease and tooth decay by implementing an "upstream" intervention?

In the realm of cost-benefit analysis, one can further consider not only the two possible treatment paths (clearance versus no clearance), but also the costs and benefits of an option that includes an intervention. Ideally, periodontal disease would be

prevented from happening in the first place and not merely mitigated by late treatment. It is therefore reasonable to wonder what early interventions could be implemented. For example, if veterans, who are ordinarily not eligible for dental care, were allowed to undergo semi-annual cleanings as part of their benefit, would there be a measurable reduction in disease rate? The alternative hypothesis is also possible: patients' lack of participation in regular hygiene or continuation of at-risk behaviors such as smoking may overwhelm whatever benefit a periodic cleaning could offer. This question needs further investigation.

7. Should there be a national VA policy?

Currently, there is no national policy that provides dental coverage for most veterans. How the (approximately 170) VA Medical Centers in the United States (US) work around this is unknown. A national policy for determining who needs clearance, where that clearance is done, and what needed treatments are to be covered is essential, and advocating for such a policy requires robust data. At the bare minimum, a replication of the study here should be completed. Data collection on the various local discretionary policies—either providing clearance/treatment or denying surgery as well as associated outcomes—may provide additional helpful insight.

8. Is it proper to screen for periodontal disease if full treatment is not covered?

Under the current arrangement, all patients with clinically significant periodontal disease and tooth decay are offered extraction as the only option. Patients with dental coverage—or those willing and able to pay out of pocket—may avail themselves of restorative surgery, including fillings, crowns, and implants. In other words, the dental care currently offered to patients who fail dental clearance is not the gold standard. It bears repeating that Congress has not authorized the VA to provide gold standard dental care; this is not a local decision. At the same time, one could argue that because total joint replacement is authorized, and because giving state-of-the-art total joint replacement care requires state-of-the-art dental care, there is an implicit mandate for better dental coverage, at least for total joint replacement patients. This argument can be fleshed out with more refined cost-benefit analyses.

9. Will dental clearance or a similar rule cause disparate access to care by race or socioeconomic status?

Wang, Wong, and Humbyrd have shown that “clinical decision-making algorithms that set inflexible cutoffs with respect to BMI, HbA1c, and smoking status disproportionately discourage

performing lower extremity arthroplasty for non-Hispanic blacks and individuals of lower socioeconomic status.”⁷ It is not hard to imagine that applying such algorithms to dental status might have a similar effect, as the underlying prevalence of disease in those groups is likely to be higher. Thus, the question above is raised.

A few points must be kept in mind. A rule that disproportionately restricts access to care by certain groups is not necessarily discriminatory and not necessarily worthy of being discarded. Specifically, if the patients restricted are those at excessively high risk, then a restrictive rule can help ensure a lower rate of complications in those groups. Such a rule is “anti-discriminatory,” one might say. Intent and optics matter less; what matters most is outcome. A rule that lowers complications is beneficent. Thus, the outcome of any rule of exclusion must be carefully examined, especially at the level of patient preferences (not system economics).

Of course, if there is a disparate impact caused by a rule, then there is an accompanying moral imperative to do everything that can be done to minimize risk in a healthy way. If HbA1c levels predict outcome, as they do, and if an HbA1c rule disproportionately affects certain populations, as it does as well, the best response is not to ignore the rule (for that puts patients at risk) and not to impose it blindly either, but to make every effort to normalize the HbA1c level in all patients.

10. Does the US, the richest country in the history of the world, offer its citizens (veterans and non-veterans alike) reasonable access to dental care?

This final question is asked rhetorically, as the data collected here do not speak directly to this point. Still, it is worth noting that the lack of routine dental care for veterans is consistent with what is found on the civilian side as well. Dental coverage is decidedly lacking in the US. Medicare does not cover routine dental care at all, and the majority of people on Medicare have no supplemental (private) dental coverage.⁸ Medicaid covers dental care for children, but fewer than half of the states in the US elect to include dental services for adults. When Medicaid provides benefits, reimbursement and access are, by definition, at (low) Medicaid levels and this low payment hinders access. By contrast, other Western countries offer quite a bit more. For example, the British National Health Service includes (with a copay) preventative dental care as well as X-rays, fillings, and crowns.⁹ In Canada, preventative dental care is not covered under Canadian Medicare, although dental surgery is; and 67% of Canadians have supplemental (private) insurance to cover dental care.¹⁰ The French National Health Insurance (NHI) covers 70% of dental costs, though 95% of French patients have private insurance to cover the remaining balance.¹¹ And finally, under the German Statutory Health Insurance (SHI), preventative and basic dental care are fully covered.¹²

For historical reasons, in the US “a dentist is not just a special kind of doctor, but another profession entirely.”^{13,14} For better or worse, that’s unlikely to change. Nonetheless, the findings here make it clear that oral health impacts overall health in general and musculoskeletal health in particular. As such, the divide must be bridged if we are to maximize overall wellbeing and human flourishing.

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