Editor's Spotlight/Take 5

Editor's Spotlight/Take 5: Is Single-stage Revision According to a Strict Protocol Effective in Treatment of Chronic Knee Arthroplasty Infections?

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It is with great pride that *Clinical Orthopaedics and Related Research*® presents the 2014 Proceedings of the Knee Society. As has been the case every year for nearly two decades now, the partnership

Note from the Editor-In-Chief: In "Editor's Spotlight," one of our editors provides brief commentary on a paper we believe is especially important and worthy of general interest. Following the explanation of our choice, we present "Take Five," in which the editor goes behind the discovery with a one-on-one interview with an author of the article featured in "Editor's Spotlight."

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between *CORR*® and the Knee Society has produced a collection of papers that should influence thought on the most important current issues in the treatment of the adult knee. While we could feature any of the dozens of papers from those proceedings in the spotlight section, including any of several award-winners [1, 3, 4], we have chosen to highlight a paper by Professor Fares S. Haddad's group in the United Kingdom on a thorny and resistant topic: Single-stage exchange revision for the infected TKA.

We choose this paper because Professor Haddad's group examined a clinical problem that points to a number of important general-interest issues. Although surgeons have been performing knee replacements for half a century or so, the question of whether

the patient with the infected TKA should have a staged-revision approach or a direct-exchange procedure remains unanswered. After 50 years, why do we not know the answer to such a straightforward question?

Answering this question matters not only to patients and their surgeons, but also to healthcare systems. The societal burden of the infected TKA in terms of cost and morbidity is considerable and growing [2], and the governmental, social, and corporate entities charged with ensuring the effective and efficient delivery of care to patients with this problem have a stake in our answering it definitively. Similarly open questions, likewise raised decades ago or longer, persist in every corridor of our specialty: What causes low-back pain and how should it be managed when reasonable non-surgical approaches fail? Which "findings" on MRI actually cause pain in the shoulder (or the ankle, or the wrist), which are merely incidental, and how can we be sure? No doubt you can think of others.

The lead author of this paper, Professor Haddad, is a surgeon in the

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National Health System in the United Kingdom, a researcher with a special interest in the clinical question at hand, and the Editor-In-Chief of the *Bone & Joint Journal* (formerly the British edition of the *Journal of Bone and Joint Surgery*). From that vantage point, Professor Haddad can offer a unique perspective about how important questions get answered – and why they sometimes do not.

While the big-picture issues are interesting, the other important reason we highlight this article is that it advances the dialogue on the specific topic at hand. As I suggested earlier, two operations to treat a problem that can be handled in one is expensive and needlessly morbid; one operation that fails to solve the problem may be more so. But as of now, we do not know where the balance point is: That is, which patients may be safely managed with the single-stage approach? The authors of this study help us answer this question. They found that patients who met the indications for single-stage revision – relatively little bone loss, the absence of immunocompromise, a good soft-tissue envelope, and a known organism sensitive to antibiotics – were treated effectively using a single-stage approach. Even so, the authors point out we still need larger, prospective, multicenter trials to answer our remaining questions about direct-exchange revision TKA.

Of course, we have heard that refrain for decades now. What stands between us and those more-definitive studies? Join me as I discuss this important social question, and four others, in the Take 5 Interview that follows with Professor Fares Haddad.

Take Five Interview with Fares Sami Haddad, FRCS (TR&O), first author of “Is Single-stage Revision According to a Strict Protocol Effective in Treatment of Chronic Knee Arthroplasty Infections?”

Seth S. Leopold MD: *Congratulations on your paper. This is some very exciting work. You are weighing in on a controversy that has persisted for at least 25 years – whether infected*

knee replacements should be treated with single-stage direct-exchange or two-stage revision. This is on the list of our specialty's big unanswered questions, which itself raises a question: As a specialty, what can we do differently from the “systems level” – societies, funding agencies, journals, governmental bodies – to do a better job with the “big questions” like this one?

Fares S. Haddad FRCS (Tr&O): As a profession, it is important that we start to agree on the key research questions that need to be addressed, create multinational interinstitutional and interdisciplinary collaborations that can tackle them, and lobby together to ensure that we get appropriate infrastructure and funding to tackle these issues.

Dr. Leopold: *Although you achieved apparent eradication in all patients who underwent the single-stage approach, many studies have suggested that there are likely to be tradeoffs involved in the decision to use a direct-exchange approach instead of two-stage revision: Less morbidity for those patients whose treatments are successful (direct exchange) versus lower recurrence risk of infection (two-stage approach). Assuming this is the case, how might clinicians best convey that uncertainty to patients in a way that is fair, and in a way that patients can understand?*

Fares Sami Haddad, FRCS (TR&O)

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Prof. Haddad: This is a critical question, particularly in the era of shared care and increased patient involvement in our decision-making. We typically approach this by explaining to patients that our belief – based on our experience and on the literature – is that the treatment most likely to get rid of their infection is a staged procedure, but that this has a high price in terms of time in the hospital, number of operations, time away from work and family, as well as in terms of final functional outcome. We explain that there is an alternative that allows us to do the procedure in a single stage, and that our data and the data of others, suggests that this too can be successful. We also explain that with this approach, there is a slightly higher risk of infection recurrence. This increased risk is offset by a quicker recovery and less time away from home, family, and work. Many patients ask for odds in this situation; we explain that there are no certain figures, but that we would only put them forward for single-stage revision if we believe that they are good candidates for it. We refer to our protocol and to the selection criteria that we have used. We quote a success rate of more than 90% for infection control in patients meeting these criteria. We make it clear to all the patients that a multidisciplinary team will help guide their care, and that there is even the possibility of changing from one to two-

stage during surgery if we meet unexpected issues or complications.

Dr. Leopold: *Governmental agencies and health insurers are stakeholders here, as well. How, if at all, should those systems consider cost in the decisions about caring for patients with infected arthroplasties, particularly given all this uncertainty?*

Prof. Haddad: Cost now factors into everything that we do, although robust cost-effectiveness studies in this area are few and far between. I would suggest that the best focus for governmental agencies and commissioners would be the identification of economies of scale, with the goal of ensuring efficiency and cost-effectiveness by providing care for patients with infectious complications at specialized centers, so that appropriate multidisciplinary teams can manage them in a more streamlined way. It would then be up to those teams to provide expert care, and to determine the best treatment for each individual patient, rather than creating central mandates and guidelines that are difficult to apply in this setting. We must not forget that a patient with an infected arthroplasty is one who faces a long, arduous, painful treatment, often with a high likelihood of residual pain and functional limitations, and is someone whose expectations of his or her knee replacement have unfortunately not been met. That patient requires an

individualized approach in an appropriate setting.

Dr. Leopold: *Our specialty has been debating this topic for decades, and there seem to be important geographic differences in the approaches used between European and North American surgeons (the former group seeming perhaps more-positively disposed towards direct-exchange revision). What about this specific clinical problem has made it so difficult to answer definitively?*

Prof. Haddad: The infected arthroplasty presents so many difficulties that different groups, countries, and continents have tended to follow the philosophies of their opinion leaders, who have influenced practice patterns on this subject in the past. Both the single-stage approach, which is popular in Germany and in certain parts of Europe, and the two-stage approach, which has many proponents in North America, have a logical basis and require technical expertise. I fear that it is the difficulty in standardization here and the lack of large series that have made it almost impossible to prospectively compare the two treatment protocols in a sufficiently dispassionate way in order to reach one universal conclusion. Part of our work during the last 15 years has been to find a middle ground whereby the advantages of the single-stage technique still can be applied to some

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patients while recognizing the excellence and utility of the two-stage technique, which should remain the standard treatment for the majority of patients for the time being. I believe there will be a shift towards more single-stage surgery in the future, but I suspect that this should be in centers with the appropriate expertise, resource, and multidisciplinary back-up to manage that. This also will evolve as we access better antibiotic delivery systems and protective implant surfaces.

Dr. Leopold: *Finally, your results are impressive, especially considering the difficulty of the problem you were treating. In aggregate, you achieved infection control in some 95% of your patients, and in all of the patients treated with single-stage direct-exchange revision. I am almost more surprised by the two-stage results, though, which included a group of patients with all the “easy ones” removed and placed into the single-stage group; how do you account for this extraordinary level of success?*

Prof. Haddad: You are quite right, and although you are the first to raise this question directly, I agree with you that the most impressive feature

of this paper is not the success of the single-stage revision, which we expected as these were our fittest patients with the fewest comorbidities and most benign infections. Rather, it is the success of the two-stage cohort. I would add as a caveat that repeat two-stage procedures for those who had failed a previous two-stage elsewhere were not included in this pathway. If I have to identify one factor that has helped us achieve the success rates that we have documented, it would be the meticulous and dedicated multidisciplinary team that we have built up to look after these patients. There are so many steps and areas of expertise required in order to manage prosthetic joint infections effectively, and it is by having the appropriate support in the logistic and professional sense from general physicians, infectious disease experts, microbiologists, operating environment experts, orthopaedic surgeons, plastic surgeons, vascular surgeons, peripheral nerve surgeons, nurse specialists, hospital managers, rehabilitation experts, and physiotherapists, that we have been able to provide an environment where we can offer these patients a higher chance of success.

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