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Infection in Total Knee Arthroplasty; an overestimated problem?

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Introduction

Total Knee Arthroplasty (TKA) is a common procedure with approximately 60000 preformed each year in the United Kingdom. Infection is a recognised cause of revision in TKA, typically the infection rate is 0.94%[1]. The National Joint Registry (NJR) gathers data on TKA and records each implanted device and whether revisions occur; this data is submitted via a standardised K2 form which is filled out at the time of the revision surgery and requires the surgeon to confirm the indication for the revision based on available data and clinical suspicion.

The diagnosis of infection is based upon clinical signs, symptoms and the results of clinical investigations including radiological, microbiological and biochemical studies. These results may not be available at the time of surgery, particularly microbiological samples from theatre, which can take several weeks to provide a positive or negative result. This process leaves the potential for incorrect results to be entered into the NJR dataset as contradictory results may become apparent after revision surgery, after the K2 form has been submitted.

Methods

The NJR dataset for each surgeon undertaking TKA in our unit was retrieved with the permission of each individual surgeon concerned. This was combined into one single dataset.
All revisions for infection for a single companies implants that were performed in our unit were analysed.
Clinical notes, biochemical, microbiological and radiological results were analysed. C Reactive-Protein (CRP), the results of positive cultures, imaging findings and clinical signs of infection were recorded.
If there was a different cause for revision noted it was recorded.

Results

- 3617 primary TKAs of a single manufacturer were carried out by surgeons between 2003 and 2020
- There were 107 revision procedures carried out on this dataset of primary devices. Of which 28 devices had their cause of revision as infection entered into the NJR.
- Of these entries, 6 had no evidence of infection following analysis of microbiological, radiological and biochemical data.
- The true causes of revision in these cases were 4 cases of aseptic loosening, 1 pain and 1 instability.
- Six cases that had been recorded as infection were originally performed in the private sector and data was unavailable.
- Assuming those that were lost to follow were infected the rate of infection has been overestimated by 21%

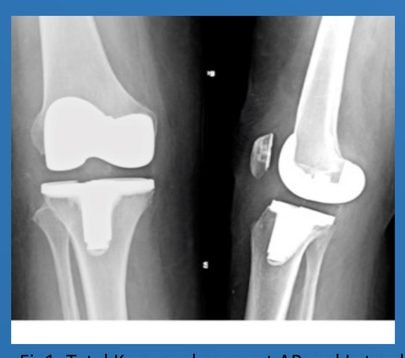

Fig1: Total Knee replacement AP and Lateral

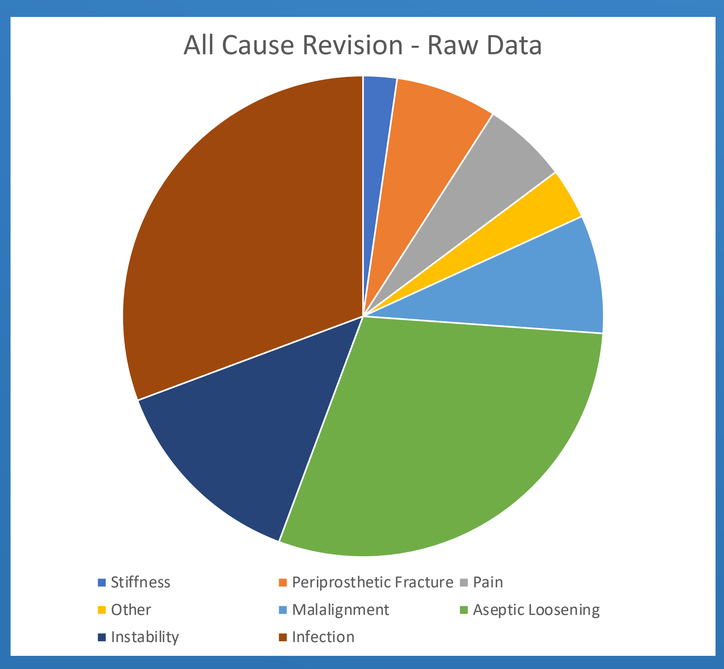

Chart 1: Causes of revision in the dataset as recorded by the NJR

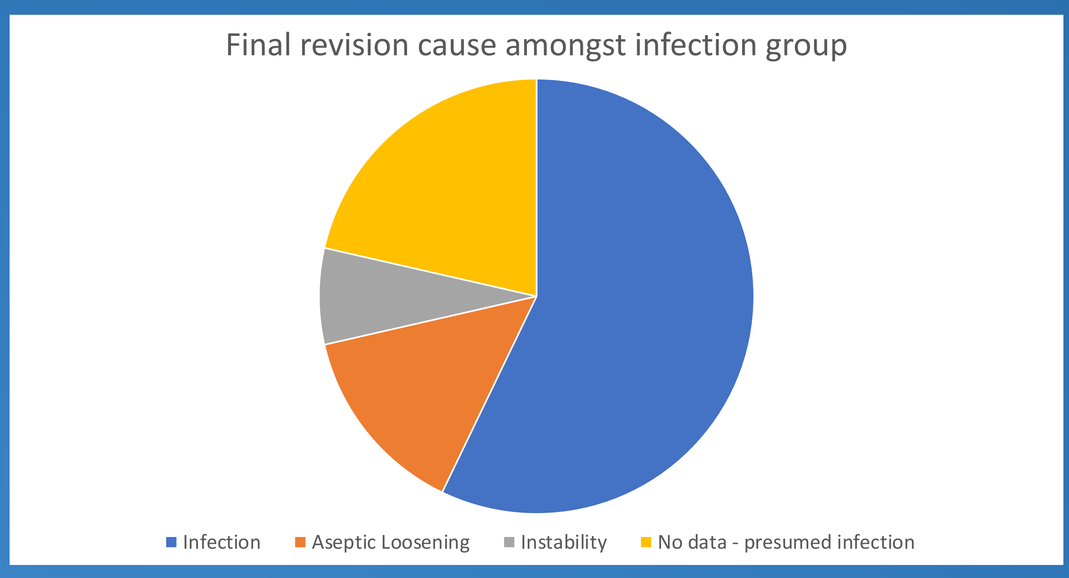

Chart 2: Chart showing final cause of revision following analysis of those recorded as infection on the NJR

KNEE REVISION PROCEDURE DETAILS		
Procedure Type	Single stage revision (includes modular exchange for indications **other** than infection) ☐ Stage 1 of 2 Stage Revision ☐	Stage 2 of 2 Stage Revision ☐ Conversion to Arthrodesis ☐ Amputation ☐ Debridement And Implant Retention (DAIR) ☐
Revision of	Primary Total Arthroplasty ☐	Previous Revision Arthroplasty (excluding excision arthroplasty) ☐
Side	Left ☐ Right ☐	
Indications For / Findings at Time of Revision (select all that apply)	**Aseptic Loosening** Femur ☐ Tibia ☐ Patella ☐ **Infection** ☐ **Dislocation / Subluxation** ☐ **Lysis** Femur ☐ Tibia ☐	**Instability** ☐ **Wear of Polyethylene Component** ☐ **Component Dissociation** ☐ **Unexplained Pain** ☐ **Malalignment** ☐ **Peri-Prosthetic Fracture** ☐ **Implant Fracture** ☐ **Stiffness** ☐ **Progressive Arthritis Remaining Knee** ☐ **Other** ☐

Fig 2: The procedure details section of the K2 form for the NJR. Note the decision regarding the indication for revision is required at the time of surgery

Discussion

Infection remains a significant cause of revision in TKA. The current method of recording this important information at the time of revision leaves the potential for an incorrect cause of revision to be entered into the NJR. This could have the effect of over reporting infection as a cause of revision at the expense of other causes such as aseptic loosening and poorly placed implants.

The main factor contributing to this is the delay in receiving microbiological results from intraoperative samples. Even in situations of very rapid turnarounds the results of cultures will take at least 48 hours, long after the K2 forms have been filled in and filed.

One potential way of preventing this may be to hold the K2 forms in a form of 'quarantine' until the results of intra operative cultures have been received whereupon they could be released to the NJR. Though this would cause administrative difficulties, the resulting quality of data would be much improved across the NJR, and would more accurately represent the true burden of revision. Other technological solutions could be used whereby the K2 form data is held in an online portal which can be changed retrospectively when new data comes to light.

The limitations of this study are that this is a single centre dataset, there were a number of patients lost to follow up, other causes of revision were not assessed for incorrect entries (i.e aseptic loosening entered were true cause of revision was infection)

Conclusions

- Though infection remains an important cause of revision there is likely to be an over reporting rate in the NJR datasets
- There needs to be consideration of how this could be mitigated by changing reporting methods
- This reporting error my be masking other important causes of revision such as aseptic loosening, this may be of relevance in the knee where an implant failing by tibial loosening may be picked up late if miscoded as infection[2]

References: 1. NJR Annual Report 2020, National Joint Registry, 2020, 2. Keohane et al, High rate of tibial debonding and failure in a popular knee replacement: A cause for concern, Knee, 2020

No Conflicts of Interest declared