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EDITORIAL

Prosthetic joint infection

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Prosthetic joint infection (PJI) is still a relatively rare but devastating complication following total hip (THA) and knee (TKA) arthroplasty. The incidence of PJI ranges from 1% to 2% in primary procedures. The overall weighted mean of PJI from multiple national registry data is 0.97% for THA and 1.03% for TKA.[1] The risk of revision due to PJI has risen by twofold for primary THA and by threefold for revision THA.[2] Moreover, the demand for arthroplasty is expected to increase by 400% from the early 2000s to 2030, which is likely to further increase the prevalence of PJI. When this is allied to a reduction in other causes of revision, such as polyethylene-related loosening and osteolysis,[3] a lower threshold for diagnosis of infection, including so-called culture-negative infections, and better capture in joint registries – the genesis of the epidemic becomes clearer.

Despite our best efforts to reduce the incidence of PJI, international registry data show the rate to be on the increase.[4] One must also consider that joint registry data only capture infection as an indication for a revision procedure (e.g. one-stage, two-stage). Cases managed with long-term antibiotic suppression are not included, nor are those managed with washout debridement and implant retention. The validity of the UK National Joint Registry (NJR) was compared with records from the London Implant Retrieval Centre, with 39.1% of retrieved implants being incorrectly registered over a ten-year period.[5] A study analyzing the data in the Danish joint registry found that only two-thirds of revisions for infection were captured, and only 77% of them were accurately reported.[6] Studies analyzing data from other registries have also reported similar findings.[5,7-9] Therefore, one must appreciate that registry data have not fully captured the prevalence of infection, but may be now be starting to do so, either directly or through linkages to other datasets.

Highly crosslinked polyethylene has shown wear rates 40 times lower than conventional polyethylene. Improvement in implant technology and surgical technique will result in a decline of revisions for aseptic loosening, wear, dislocation, and instability.[10-17] This will potentially see PJIs becoming the leading cause of revision procedures.

PJIs are notoriously difficult to manage, resulting in the need for multiple interventions and prolonged courses of systemic antibiotics. The impact on a patient's life is dramatic, involving long periods of immobility, recurrent hospital encounters and potential psychological distress. There is also a significant economic burden to costing at a mean of £50,000 for a revision procedure for an infected THA in the UK. Efforts therefore continue to improve the recognition and management in order to preserve function and reduce morbidity.[4,18,19]

There has been much interest in the diagnostic criteria for PJI. The Philadelphia consensus meeting in 2018 suggested a score-based system to replace the Musculoskeletal Infection Society (MSIS) criteria.[20] However, too much emphasis is applied to white cell count, D-dimer, and relatively new biomarkers such as alpha defensin. This has to an extent been driven by new tests available in the market for these biomarkers. D-dimer is a non-specific haematological marker and its validity in detecting PJI is questionable.[21] There are several studies that have investigated the sensitivity and specificity of alpha defensin, using the 'lateral flow test' to detect PJI. Analyzing these studies reveals a potential bias, with great variation in sensitivity and specificity between studies.[22-29] We need to be mindful of changing diagnostic criteria too frequently as this would complicate the interpretation of the literature on the subject.

PJI diagnosis must continue to be based on a combination of clinical and laboratory findings that include blood tests, synovial fluid analysis, microbiological and histopathological evaluation of periprosthetic tissue, and intraoperative inspection to reach a definitive diagnosis. The new tests and criteria discussed

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above will lead to an increase in numbers of 'culture-negative' infections. This is clearly adding volume to the 'infection' burden.

There is now a shift towards using genomics and proteomics, which identify proteins transcribed via messenger RNA (mRNA) in response to infection.[30,31] Currently, the results have to be carefully interpreted with due consideration for the possibility of false positives, as we are yet to validate the clinical relevance of the results of these tests. The converse problem is that we must also be cautious in diagnosing PJI in the absence of organisms in periprosthetic tissue and fluid culture. While culture-negative infection undoubtedly contributes to the increasing burden,[32] we must be careful not to overcall this devastating complication. This is particularly important as the management of choice in most countries remains very aggressive/ablative.

The UK NJR reports that the number of revision procedures performed for PJI has increased from 140 in 2003, to over 1,000 per year.[33] Despite our collective efforts in tackling infection,[34] the epidemic of PJI is a reality. Careful evaluation over the next decade will confirm whether this has been inflated by our having a higher index of suspicion, by the reduction in other failure modes, by modifying our diagnostic protocols, and by better capture in studies and registries. Regardless, we must refocus our prevention and management strategies to control the infection burden.

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