An assessment of prosthetic joint infection risk: A single-centre analysis

L Cottom[1,2], P Wright[1]

[1] Department of Microbiology, Queen Elizabeth University Hospital , Glasgow
[2] Department of Microbiology, Glasgow Royal Infirmary, Glasgow

NHS Greater Glasgow and Clyde

Introduction

Arthroplasty remains an effective surgical intervention that improves quality of life. In Scotland over the last decade there has been a 41% increase in the number of cases of both knee and hip arthroplasty, with 15,781 cases being performed in 2015[1].

The incidence of periprosthetic infection following hip and knee arthroplasty is estimated to be 1–2%, and is dependent on a host of factors[2,3].

Prosthetic joint infection (PJI) albeit rare, remains an important diagnostic and therapeutic challenge, associated with significant morbidity and mortality.

Identification of patients as high risk for PJI would allow risk stratification at pre-operative assessment, inform clinical decision making and increase the index of suspicion allowing prompt diagnosis and effective management to be initiated.

Aims

The aim of our study was to review and risk-assess the patient population undergoing hip or knee arthroplasty at one of the large teaching hospitals in the West of Scotland.

Method

A retrospective analysis was performed over an 8-month period extending from May to December 2015. Patients were identified using our electronic clinical record system (Clinical Portal) and laboratory information management system (Telepath).

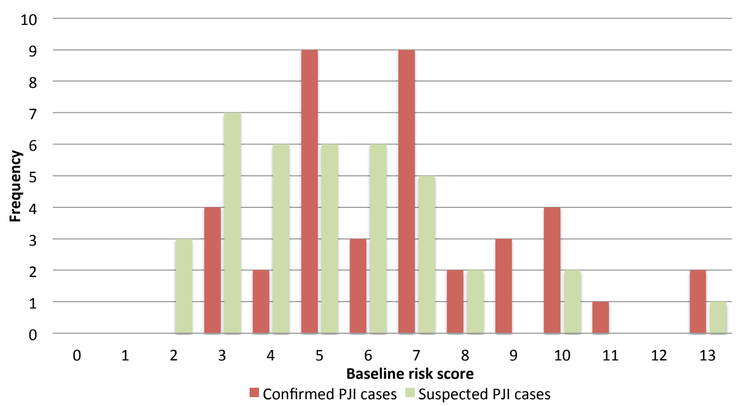
Any patient who had intra-operative samples sent for microbiological investigation for a suspected or confirmed infection involving a knee or hip arthroplasty was included. Cases were either categorised as 'Suspected', when a PJI diagnosis had been ultimately excluded, or 'confirmed' when the PJI diagnosis had been confirmed according to either the clinical practice guidelines by the Infectious Diseases Society of America (IDSA)[3] or on clinical judgement.

An assessment of PJI risk was based on the proposed Mayo prosthetic joint infection risk score developed by using multivariable regression models from a large case-control study[4]. The baseline risk score included assessment of prior arthroplasty or operation on the index joint, an abnormal body mass index (BMI), immunosuppression, ASA score, and procedure duration[4].

Table 1
Mayo PJI risk scoring system. Baseline risk assessment.

Risk factor	Numerical score
BMI	
< 25 or ≥ 40	2
25-40	0
Prior other operation (any surgery on the index joint other than arthroplasty)	2
Prior arthroplasty	2
Immunosuppression (any immunosuppressive therapy, diagnosis of HIV or AIDS, malignancy or autoimmune disorder)	2
ASA score	
1-2	0
3	2
4	6
Surgical procedure time	
< 2 hrs.	1
2-4 hrs.	0
> 4 hrs.	3
Baseline risk score range	**0 - 17**

Figure 1
Baseline risk score of study population



Method

A numerical score was assigned for the presence of each factor in accordance with the Mayo scoring system (Table 1). The 30 day mortality and 1 year all cause mortality rate were also calculated.

Results

A total of 99 patients over the 8-month period were identified. No statistical difference in the number of males and females was observed for the study population. The patient age range was 33 to 93 years.

54 patients had a confirmed PJI and 45 patients were categorised as having a suspected PJI. Of the confirmed cases, 40 involved a hip arthroplasty and 14 cases involved a knee arthroplasty. Of the suspected PJI cases, 36 involved a hip arthroplasty and 9 cases involved a knee arthroplasty.

The mean baseline risk score for the confirmed PJI cohort was calculated to be 6.82 (score range 1 to 11; Figure 1). For the suspected PJI cohort the mean was 5.29 (Range 0- 11). When compared using an unpaired t-test a statistically significant difference (p=0.0092) between the two cohorts was demonstrated.

The 30 day mortality rate for the study population was found to be 3% (4% for the suspected PJI cohort vs. 2% for the confirmed PJI cohort). A significant difference in all cause mortality at 1 year was observed between the two study cohorts, this was calculated to be 4 % for the suspected PJI cohort compared to 15% in the confirmed PJI cohort.

Conclusions

PJI remains an important complication of arthroplasty, with the rate of joint replacement surgery increasing over the last decade.

This study provides an insight into the risk factors and characteristics of our patient population and could provide a robust means to assess for PJI risk. Application of the baseline risk score to our study population suggests that a score of ≥ 6.82 was associated with a statistical significant risk of PJI.

Limitations to our study were the small population size and a potential element of bias in identifying our patient population. We believe however further evaluation and analysis is warranted. Prospective identification of patients at risk would importantly allow both risk stratification and targeted prevention strategies.

References

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