A Commentary on Research Trends and Synopsis of Prosthetic Joint Infection Following Arthroplasty

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Abstract

As the rate of total knee and hip arthroplasty rises, so does the rate of per prosthetic infection following these procedures. To combat these rising rates, orthopedic surgeons must access quality publications to guide clinical practice towards effectively preventing, diagnosing, and treating Periprosthetic Joint Infection (“PJI”). A citation analysis was conducted to describe trends in the current and future research of PJI and serves as a comprehensive summary and reference for impactful PJI literature. The present commentary discusses pertinent findings from the bibliometric review study and provides a synopsis of PJI based on influential literature on the topic.

Keywords: Prosthetic joint infection • Post-operative complications • Peri prosthetic • Joint arthroplasty

Description

A bibliometric analysis of the current literature surrounding PJI after total joint arthroplasty evaluated the 50 most cited articles using the Clarivate Analytics Web of Science database. The analyzed metrics were citation frequency, publication year, country of origin, level-of-evidence, article title, and contributing authors/institutions[1]. Among the pertinent findings, the most cited article was “Current concepts: Prosthetic-joint infections” by Zimmerli et al. Level of Evidence (“LOE”) of 2 and 3 were the most common. Clinical outcomes were the most common article type. Mayo Clinic (n=15,30%) and Thomas Jefferson University (n=12,22%) produced the most publications. Hansen (n=9,18%) and Paris (n=8,16%) were the most productive authors. 2000-2009 (n=25;50%) was the most prolific decade in terms of number of publications.

Total Joint Arthroplasty (“TJA”) procedures performed annually are increasing in the United States, with more than 1,000,000 procedures currently and 2,000,000 expected by 2030 [2]. Approximately 2% of these procedures are complicated by per prosthetic joint infection. PJI incurs a financial burden of over $600 million on US hospitals[3].

Risk factors of PJI after TJA include a history of more than one arthroplasty, immunocompromised due to chronic medical conditions, immunosuppressive medications such as corticosteroids and biologics[4] and post-operative operative complications such hematomata, surgical site infection, and wound dehiscence.

Common clinical signs/symptoms of PJI include localized pain, warmth, erythematic, joint effusion, and fever. Early-onset PJI is often acquired during surgery or from spread of superficial organisms during wound dehiscence. Associated signs include hematoma and superficial necrosis of the incision. Delayed-onset PJI most commonly occurs due to hematogenous seeding from a distant infection site. This timing-of-onset classification allows for identification of the offending organism and targeted treatment [5].

With an increased clinical suspicion, diagnosis includes a combination of history, physical exam, synovial fluid analysis, serum inflammatory markers, culture data, radiography, and intraoperative findings [6]. A formal diagnosis involves a sinus tract communicating with the prosthesis, an isolated pathogen on two separate tissue or fluid samples, or 4 of the 6 of the following criteria: Elevated erythrocyte sedimentation rate and C-reactive protein, elevated synovial white blood cell count, elevated synovial neutrophils percentage, presence of purulence in affected joint, isolation of a microorganism in one culture of per prosthetic tissue or fluid, or greater than five neutrophils per High Power Field (HPF) in five HPFs at x400 magnification. Diagnostic approach includes the clinical exam and laboratory evaluation, followed by joint aspiration and cultures [7].

General treatment strategies for PJI involve surgery and targeted antimicrobial therapy. Surgical options include debridement and prostheses retention, resection arthroplasty with or without implantation, and amputation[6]. For non-surgical candidates, four to six weeks of pathogen-directed antibiotic therapy is used, followed by long-term antibiotic therapy.

Conclusion and Future Perspective

Recent research on PJI after TJA centers on PJI prevention, clinical outcomes, and updated diagnostic criteria. Examples of trending topics are as follows: The use of proteomics and polymerase chain reaction to identify biomarkers and cytokines implicated in PJI, the use of sanitation fluid cultures for diagnosis and treatment, and the use of antibiotic-loaded bone cement during TJA for PJI prophylaxis.

Conflicts of Interest and Acknowledgements

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