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INVITED EDITORIAL

International consensus on periprosthetic joint infection

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On July 31 and August 1 2013, 342 delegates from 80 different countries and 50 different societies came together for a unique meeting. The International Consensus Meeting (ICM) on Periprosthetic Joint Infection (PJI) took place in Philadelphia, USA. Two leading orthopaedic surgeons involved in the treatment of periprosthetic joint infections organized this unique meeting. Javad Parvizi, MD from the Rothman Institute in Philadelphia, USA and Thorsten Gehrke, MD from the Endoclinic in Hamburg, Germany prepared this gathering carefully in every detail.

The mission of the ICM was to organize, write, and distribute consensus statements and other guidelines in the field of orthopaedics. The ICM is committed to improve and standardize patient care and medical treatment decisions based on international collaboration with top experts in the field of orthopaedics and based on a thorough review of available literature, standard practices and expert opinions regarding various topics in orthopaedics and other relevant fields such as infection control. The objectives of the meeting were to evaluate available literature to extract evidence for current practices and identify areas in need for further research, as well as to develop a consensus, based on evidence-whenever present, for issues that involve the care of patients with musculoskeletal infections and to publish the agreed consensus for dissemination among the orthopaedic community (*9*).

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The attending delegates were allocated to 15 different workgroups and the subjects of these groups were the following :

1. Mitigation and Education
2. Perioperative Skin Preparation
3. Perioperative Antibiotics
4. Operative Environment
5. Blood Conservation
6. Prosthesis Selection
7. Diagnosis of Periprosthetic Joint Infection
8. Wound Management
9. Spacers
10. Irrigation and Debridement
11. Antibiotic Treatment and Timing of Reimplantation
12. One-stage versus Two-stage Exchange
13. Management of Fungal or Atypical Periprosthetic Joint Infections

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14. Oral Antibiotic Therapy
15. Prevention of Late PJI

Based on the work of these 15 groups, discussing the different questions, the consensus document was developed using the Delphi method under the guidance of William Cats-Baril, PhD from the University of Vermont, Burlington, USA. After synthesizing the literature and assembling a preliminary draft of the consensus statement, over 300 delegates attended the face-to-face meeting to discuss and vote on the questions/consensus statements. These questions were first discussed in the small work groups and then during the General Assembly on July 31 where final adjustments were made to the content of the questions. On August 1 2013, all delegates came together during a second General Assembly and voted on the 207 questions/consensus statements that were presented. The voting process was conducted using electronic keypads, where one could agree or disagree with the consensus statement or abstain from voting (*9*).

The strength of the consensus was judged according to the following scale :

1. Simple majority (50.1%-59%) : No Consensus
2. Majority (60%-65%) : Weak Consensus
3. Super Majority (66%-99%) : Strong Consensus
4. Unanimous (100%) : Unanimous Consensus

Of the 207 questions, there was one unanimous vote on one single question, a strong consensus for 202 questions, a weak consensus for 3 questions and finally no consensus on one other question.

The three questions with a weak consensus covered the recommendation on the use of an occlusive dressing with alginated hydrofiber (Workgroup 8, Question 1A), on the management of persistent wound drainage for greater than 72 hours and its treatment with wound care (Workgroup 8, Question 3A). And a final question with a weak consensus was on the definition of a late periprosthetic joint infection (Workgroup 15, Question 1). The single question without consensus (Workgroup 6, Question 7) was on the statement that the incidence of surgical site infection (SSI) might be lower with the use of porous metal (tantalum) during revision arthroplasty compared to titanium. The unanimous vote was on controlling operating room (OR) traffic (Workgroup 4, Question 5) showing that this problem is universal and within the focus of attention of surgeons around the world (*8,13*). This shows that much more attention should be directed towards this problem and that in some way both nurses and anaesthetists should be motivated by increased awareness and responsibility for the consequences for the patient. Organisation, lean thinking and structurizing the OR facility can reduce the opening of doors but especially useless visits should be eliminated (*8*). It would reduce the stress in the OR and mutual respect would make it possible for the surgeon to stop playing the police officer showing people they are in conflict with the rules.

The conclusions of the ICM have been published in a small booklet (*9*) and can be found online. Visit the Acta Orthopaedica Belgica homepage to find the link to the full document (http://www.actaorthopaedica.be/). Furthermore editorials have been attributed to this subject in the American Journal of Bone and Joint Surgery (*12*), the Bone and Joint Journal (*10*), Clinical Orthopaedics and Related Research (*6*) and the complete recommendations were also published as a Supplement in the Journal of Arthroplasty (*11*). The concept of the ICM to work with a Delphi method is an efficient strategy to utilize the cumulative international wisdom as a guide on this complex topic of joint infections (*3,4*). Because of its scientific method, this consensus document has become the melting pot of different opinions and as we all know, problems are similar everywhere but always a little bit different in each specific region or country (*1*). Because of this last fact, we believe the local regulations and recommendations should predominate but the findings of the ICM can be used as an enormous scientific database and massive literature review on the subject of PJI. For this reason in France, recently a local consensus paper was published after translation in French of the ICM and review by a commission of local experts. They identified 23 major differences with the current French recommendations and suggested some changes to their own national recommendations based on the guidelines of the ICM (*7*).

The limitations of an initiative like the ICM is of course that different sources of bias could be

introduced into such a document. First of all, the literature review was performed by the organizing team putting an extensive amount of time and effort into the preparation of this meeting. As a consequence, not every individual article was reviewed by each member of a subgroup leading to a potential risk of bias introduced by the author writing the conclusions submitted to the work group. A second limitation is the representation per individual country and the impact of the numbers of attendees on the way the vote is influenced. In the same way, by the selection of each attendee per country, a potential bias was introduced in the voting result. Furthermore, the way a recommendation was phrased, the vote could be influenced by the suggestion within the recommending sentence. Finally, the vote representation (in percentages) to obtain the semantic term of "Strong Consensus" with a percentage ranging from 99% to 66% gives it a 60% chance for obtaining this type of result compared to only 20% of chance for no or weak consensus. As a result a strong consensus was obtained for 202 of the 207 questions but with different percentages of agreement among the General Assembly members (*9*). This perspective of percentages needs to be translated into nominal values of attendees. If a recommendation made the strong consensus, it meant 2 out of 3 attendees agreed on the topic, which is a clear majority indeed. Even more, about 30 recommendations obtained more than 95% and 12 of them more than 97% of the votes (*9*).

Despite all of these potential criticisms, the effort has to be complimented and the initiative of Parvizi and Gehrke was fantastic. Through events like this, we, surgeons from around the world, realize that similar problems occur everywhere and that we have to collaborate to increase the quality of care for these difficult and important problems. An initiative like the ICM should be repeated in a cyclical fashion to be able to adapt the consensus guidelines whenever the current scientific knowledge changes. A great example of this is one of the three votes that obtained a weak consensus. Shortly after the ICM a study was published showing the efficacy of this type of bandages in the reduction of PJI, when used as silver coated dressings (*2*).

Until the next ICM, these current consensus recommendations should be distributed among surgeons around the globe and they should combine this information with their local guidelines and adapt the combined wisdom to the possibilities of their own practice. PJI are a serious complication for both patient and surgeon and the human suffering that comes with it for both parties should not be neglected (*5*). Following the current recommendations and guidelines as good as possible can take away some of that suffering on both sides. Knowing that all preventive measures were taken, to the best of our current knowledge, to avoid a PJI should be reassuring for potential victims of this complication. We advise therefore that every orthopaedic surgeon, not only those involved in joint replacement, read this manuscript (*9*) and acknowledge themselves with the rules and principles of infection prevention and state of the art treatment. Maybe our collaborative effort can make a difference in the overall infection rate after arthroplasty on the long run.

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