

The top 100 most-cited total knee arthroplasty publications

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The object is to objectively identify the 100 most influential scientific publications in total knee arthroplasty (TKA) and provide an analysis of their main characteristics. The Clarivate Analytics Web of Knowledge database was used to obtain data and metrics of TKA research. The search list was sorted by the number of citations, and articles were included or excluded based on relevance to TKA. The information extracted for each article included author name, publication year, country of origin, journal name, article type, and the level of evidence. These 100 studies generated a total of 35,399 citations, with an average of 355.9 citations per article. The most-cited article was cited 1273 times. The 100 studies included in this analysis were published between 2000 and 2017. 23 different journals published these 100 publications. Majority of the publications were from United States (n = 52), followed by UK (n = 10) and Canada (n = 8). The most prevalent study designs were case series (n = 32) and cohort studies (n = 30). The 100 most influential articles in TKA were cited a total of 35,399 times. The study designs most prevalent were case series and cohort studies. This article serves as a reference to direct orthopedic surgeons to the 100 most influential studies in total knee arthroplasty. More than half of the studies are from North America, and three journals hold two-thirds of the 100 most cited publications on the topic.

Keywords: Total knee replacement, knee arthroplasty, bibliographic analysis.

INTRODUCTION

Arthroplasty is a subspecialty of orthopedics that aims to replace a defective joint because of musculoskeletal pathology. It can be performed on many joints and the first attempt at joint replacement dates back to the late 19th century¹. Since the 1950s, with the introduction of the first hip and knee implants^{2,3} say, fifty cases followed up for at least five years. However, few surgeons will ever see fifty patients requiring arthroplasty of the knee, let alone operate of them, even in five years. Accordingly, this account of a new approach to the problem of knee arthroplasty is submitted in the hope that other surgeons may care to try it and thereby learn, and thus be able to teach, tile modifications and improvements that all new techniques seem so surely to need. The Journal of Bone and Joint Surgery. British volume, DOI: 10.1302/0301-620X.36B4.553, ISSN: 0301-620X, issue 4, note: publisher: The British Editorial Society of Bone & Joint Surgery, page: 553-560, source: online.boneandjoint.org.uk (Atypon, Scientific interest and technological progress have

never been exhausted until it has become a standard procedure in orthopaedic surgery. In the field of knee surgery, the total knee prosthesis appeared in the 1970s⁴ and it has now become a multi-billion dollar industry with millions of knees implanted around the world⁵. With the appearance of the theory of kinematic alignment⁶, the first patient-specific guides in 2006⁷, and at the time of the development of robotics^{8,9}, Total knee arthroplasty has always been of major scientific interest in orthopaedic surgery.

The very large number of publications on total knee arthroplasty makes it difficult to develop a comprehensive base in the literature, as it requires orthopedic surgeons to prioritize the most important studies. In this regard, citation analysis has proven to be an effective tool for identifying articles with impact^{10,11}. Citation analyses objectively identify publications that help provide valuable insight into the history and evolution of a specialized technique. The number of citations of a published scientific work has been used as a parameter to assess the level of its influence and importance. This parameter cannot be the only variable

to determine the importance of a scientific work in its field, but it allows to define the “classics” that could be used, for example, for educational purposes. In addition, the number of citations directly influences the impact factor of a journal, a generally accepted factor that determines its quality and importance¹². Analyses of the most cited articles were conducted in various medical specialties or subspecialties, including anesthesia, gynecology, urology, plastic surgery, pain management or critical care medicine¹³⁻¹⁹. In orthopedic surgery, citation analyses are available on topics such as knee research²⁰, hip and knee arthroplasty^{21,22}, arthroscopy of the knee²³ and anterior cruciate ligament reconstruction²⁴. However, no such study has been conducted specifically on total knee arthroplasty.

The objectives of this study were to identify the scientific articles in the field of total knee arthroplasty that were most frequently cited in the literature and to rank the 100 most cited articles in this field using the database Clarivate Analytics Web of Knowledge database using Boolean queries.

The hypothesis was that the level of evidence of published articles on total knee arthroplasty would be strong and that the reviews of these articles were mostly high impact factor journals.

METHODS

An institutional review board was not necessary for this study as all of the data is available in the public domain. Data was procured from the Clarivate Analytics Web of Knowledge database using Boolean queries. While no citation tracking service is perfect, the Clarivate Analytics Web of Knowledge represents a very extensive database that covers more than 21,000 peer-reviewed scholarly journals. Its database is also noted for its high-quality citation links, accuracy, comprehensive coverage, and consistent use among numerous previous citation analyses²⁵.

The initial database search took place in May 2022 incorporating various Boolean search terms to capture all possible iterations of osteotomy around the knee. The search strategy included “Knee Arthroplasty” or “Knee Replacement” or “Total Knee Arthroplasty” or “Total Knee Replacement” or “Implant” or “Prosthesis”. The search was carried out with studies published between January 2000 and December 2020 to analyze the last publications. The search was carried out with no limitations of journal, or level of evidence or country of origin. However, only publications in English were included. This resulted in a total of 30,264 articles.

The list of publications was organized by the total number of citations in descending order. The title and abstract of each publication were reviewed to determine its relevance to total knee arthroplasty. To qualify for selection, the publication had to present information on surgical outcomes, surgical indications, descriptions of procedures, perioperative management or complications after total knee arthroplasty. If the publication did not meet any of these inclusion criteria, it was excluded. In addition, total knee arthroplasty had to be the focus of the study to be included. If the publication made peripheral mention of TKA, if the study mentioned total hip arthroplasty or if the study was focused on unicompartmental knee arthroplasty it was excluded. For example, any study that analyzed the different treatment options for osteoarthritis including medical treatment in the panel was excluded. If the inclusion of a study was in question after review of the title and abstract, a copy of the full article was obtained and reviewed by 2 authors to decide upon inclusion or exclusion.

A total of 851 of the most-cited articles were reviewed to reach the 100 most-cited studies that met the designated inclusion criteria (Table I). The author’s country of origin, number of citations, journal title, year of publication, and study design (laboratory study, review article, descriptive study, meta-analysis case series, cohort study, case-control, randomized controlled trial, non-randomized controlled trial, economic study) were extracted. The level of evidence which the article’s relative risk of bias was determined based on guidelines published in *The Journal of Bone & Joint Surgery*²⁶. The study design and level of evidence was classified by the consensus opinion between 2 authors. If a consensus could not be obtained, the senior author was consulted for the final decision. The final list of the 100 most-cited articles was then organized based on total citations and presented in descending order. Citation density was then calculated by the total number of citations divided by the years since the paper was published²². If two articles had the same position based on total citation, the higher citation density was placed first.

RESULTS

Concerning the 100 most-cited TKA, three years, 2003, 2009 and 2010, were particularly productive, with 10 or more publications every year accounting for more than a third of the 100 most-cited publications (Fig. 1). Regarding the citation density, a constant increase is observed from the 2000s with four density peaks for

Table I. — The Top-100 cited TKA Publications

| Rank | Article | Journal | No. of Citations (Citation Density*) | Original Publication Year | Study Design | Level of Evidence |
|------|---|----------------------|--------------------------------------|---------------------------|-----------------------------|-------------------|
| 1 | Bourne Robert B, Chesworth Bert M, Davis Aileen M, Mahomed Nizar N, Charron Kory D J. <i>Patient Satisfaction after Total Knee Arthroplasty Who is Satisfied and Who is Not?</i> | CLIN ORTHOP RELAT R | 1273 (106.1) | 2010 | Cohort study | II |
| 2 | Lassen Michael R, Ageno Walter, Borris Lars C, Lieberman Jay R, Rosencner Nadia, Bandel Tiemo J, Misselwitz Frank, Turpie Alexander G. G. <i>Rivaroxaban versus enoxaparin for thrombopro-phyllaxis after total knee arthroplasty.</i> | NEW ENGL J MED | 1064 (76) | 2008 | Randomized controlled trial | II |
| 3 | Sharkey PF, Hozack WJ, Rothman RH, Shastri S, Jacoby SM. <i>Why are total knee arthroplasties failing today?</i> | CLIN ORTHOP RELAT R | 892 (44.6) | 2002 | Case series | VI |
| 4 | Turpie Alexander G G, Lassen Michael R, Davidson Bruce L, Bauer Kenneth A, Gent Michael, Kwong Louis M, Cushner Fred D, Lotke Paul A, Berkowitz Scott D, Bandel Tiemo J, Benson Alice, Misselwitz Frank, Fisher William D. <i>Rivaroxaban versus enoxaparin for thrombopro-phyllaxis after total knee arthroplasty (RECORD4): a randomised trial</i> | LANCET | 794 (61.1) | 2009 | Randomized controlled trial | II |
| 5 | Bozic Kevin J, Kurtz Steven M, Lau Edmund, Ong Kevin, Chiu Vanessa, Vail Thomas P, Rubash Harry E, Berry Daniel J. <i>The Epidemiology of Revision Total Knee Arthroplasty in the United States</i> | CLIN ORTHOP RELAT R | 769 (64.1) | 2010 | Cohort study | IV |
| 6 | Noble Philip C, Conditt Michael A, Cook Karon F, Mathis Kenneth B. <i>Patient expectations affect satisfaction with total knee arthroplasty</i> | CLIN ORTHOP RELAT R | 660 (41.3) | 2006 | Case series | VI |
| 7 | Carr Andrew J, Robertsson Otto, Graves Stephen, Price Andrew J, Arden Nigel K, Judge Andrew, Beard David J. <i>Knee replacement</i> | LANCET | 629 (62.9) | 2012 | Review | V |
| 8 | Lassen Michael Rud, Raskob Gary E, Gallus Alexander, Pineo Graham, Chen Dalei, Hornick Philip. <i>Apixaban versus enoxaparin for thromboprophyllaxis after knee replacement (ADVANCE-2): a randomised double-blind trial</i> | LANCET | 617 (51.4) | 2010 | Randomized controlled trial | II |
| 9 | Baker P N, van der Meulen J H, Lewsey J, Gregg P J. <i>The role of pain and function in determining patient satisfaction after total knee replacement - Data from the National Joint Registry for England and Wales</i> | J BONE JOINT SURG BR | 577 (38.5) | 2007 | Case series | VI |
| 10 | Peersman G, Laskin R, Davis J, Peterson M. <i>Infection in total knee replacement: A retrospective review of 6489 total knee replacements</i> | CLIN ORTHOP RELAT R | 567 (27) | 2001 | Case series | VI |
| 11 | Lassen Michael Rud, Raskob Gary E, Gallus Alexander, Pineo Graham, Chen Dalei, Portman Ronald J. <i>Apixaban or Enoxaparin for Thromboprophyllaxis after Knee Replacement</i> | NEW ENGL J MED | 552 (42.5) | 2009 | Randomized controlled trial | II |
| 12 | Cram Peter, Lu Xin, Kates Stephen L, Singh Jasvinder A, Li Yue, Wolf Brian R. <i>Total Knee Arthroplasty Volume, Utilization, and Outcomes Among Medicare Beneficiaries, 1991-2010</i> | JAMA-J AM MED ASSOC | 544 (54.4) | 2012 | Case series | VI |
| 13 | Parratte Sebastien, Pagnano Mark W, Trousdale Robert T, Berry Daniel J. <i>Effect of Postoperative Mechanical Axis Alignment on the Fifteen-Year Survival of Modern, Cemented Total Knee Replacements</i> | J BONE JOINT SURG AM | 504 (42) | 2010 | Cohort study | IV |
| 14 | Ginsberg Jeffrey S, Davidson Bruce L, Comp Philip C, Francis Charles W, Friedman Richard J, Hue Michael H, Lieberman Jay R, Muntz James E, Raskob Gary E, Clements Mary L, Hentel Stefan, Schnee Janet M, Caprini Joseph A. <i>Oral Thrombin Inhibitor Dabigatran Etexilate vs North American Enoxaparin Regimen for Prevention of Venous Thromboembolism After Knee Arthroplasty Surgery</i> | J ARTHRO-PLASTY | 502 (38.6) | 2009 | Randomized controlled trial | II |
| 15 | Scott C E H, Howie C R, MacDonald D, Biant L C. <i>Predicting dissatisfaction following total knee replacement: a prospective study of 1217 patients</i> | J BONE JOINT SURG BR | 492 (41) | 2010 | Cohort study | IV |
| 16 | Bathis H, Perlick L, Tingart M, Luring C, Zurakowski D, Grifka J. <i>Alignment in total knee arthroplasty - A comparison of computer-assisted surgery with the conventional technique</i> | J BONE JOINT SURG BR | 451 (25.1) | 2004 | Cohort study | IV |
| 17 | Robertsson O, Dunbar M, Pehrsson T, Knutson K, Lidgren L. <i>Patient satisfaction after knee arthroplasty: A report on 27,372 knees operated on between 1981 and 1995 in Sweden</i> | ACTA ORTHOP SCAND | 442 (20.1) | 2000 | Case series | VI |
| 18 | Bellemans Johan, Colyn William, Vandenuecker Hilde, Victor Jan. <i>Is Neutral Mechanical Alignment Normal for All Patients?: The Concept of Constitutional Varus</i> | CLIN ORTHOP RELAT R | 441 (44.1) | 2012 | Cohort study | IV |
| 19 | Kurtz Steven M, Ong Kevin L, Lau Edward, Bozic Kevin J, Berry Daniel, Parvizi Javad. <i>Prosthetic Joint Infection Risk after TKA in the Medicare Population</i> | CLIN ORTHOP RELAT R | 436 (36.3) | 2010 | Cohort study | IV |

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|----|--|-----------------------|------------|------|---------------------------------|-----|
| 20 | Lingard EA, Katz JN, Wright EA, Sledge CB. <i>Predicting the outcome of total knee arthroplasty</i> | J BONE JOINT SURG AM | 427 (23.7) | 2004 | Cohort study | IV |
| 21 | Berend ME, Ritter MA, Meding JB, Faris PM, Keating EM, Redelman R, Faris GW, Davis KE. <i>Tibial component failure mechanisms in total knee arthroplasty</i> | CLIN ORTHOP RELAT R | 418 (23.2) | 2004 | Cohort study | IV |
| 22 | Fehring TK, Odum S, Griffin WL, Mason JB, Nadaud M. <i>Early failures in total knee arthroplasty</i> | CLIN ORTHOP RELAT R | 418 (19.9) | 2001 | Case series | VI |
| 23 | Brander VA, Stulberg SD, Adams AD, Harden RN, Bruehl S, Stanos SP, Houle T. <i>Predicting total knee replacement pain</i> | CLIN ORTHOP RELAT R | 407 (21.4) | 2003 | Cohort study | IV |
| 24 | Sparmann M, Wolke B, Czupalla H, Banzer D, Zink A. <i>Positioning of total knee arthroplasty with and without navigation support - A prospective, randomised study</i> | J BONE JOINT SURG BR | 396 (20.8) | 2003 | Randomized controlled trial | II |
| 25 | Losina Elena, Walensky Rochelle P, Kessler Courtenay L, Emrani Parastu S, Reichmann William M, Wright Elizabeth A, Holt Holly L, Solomon Daniel H, Yelin Edward, Paltiel A David, Katz Jeffrey N. <i>Cost-effectiveness of Total Knee Arthroplasty in the United States Patient Risk and Hospital Volume</i> | ARCH INTERN MED | 389 (29.9) | 2009 | Economic study | VI |
| 26 | Skinner J, Weinstein JN, Sporer SM, Wennberg JE. <i>Racial, ethnic, and geographic disparities in rates of knee arthroplasty among Medicare patients</i> | NEW ENGL J MED | 387 (20.4) | 2003 | Case series | VI |
| 27 | Bellemans J, Banks S, Victor J, Vandenneucker H, Moemans A. <i>Fluoroscopic analysis of the kinematics of deep flexion in total knee arthroplasty - Influence of posterior condylar offset</i> | J BONE JOINT SURG BR | 387 (19.4) | 2002 | Case series | VI |
| 28 | Barrack RL, Schrader T, Bertot AJ, Wolfe MW, Myers L. <i>Component rotation and anterior knee pain after total knee arthroplasty</i> | CLIN ORTHOP RELAT R | 385 (18.3) | 2001 | Cohort study | IV |
| 29 | Sharkey Peter F, Lichstein Paul M, Shen Chao, Tokarski Anthony T, Parvizi Javad. <i>Why Are Total Knee Arthroplasties Failing Today-Has Anything Changed After 10 Years?</i> | J ARTHRO-PLASTY | 381 (47.6) | 2014 | Case series | VI |
| 30 | Fang David M, Ritter Merrill A, Davis Kenneth E. <i>Coronal Alignment in Total Knee Arthroplasty Just How Important is it?</i> | J ARTHRO-PLASTY | 377 (29) | 2009 | Cohort study | IV |
| 31 | Namba Robert S, Inacio Maria C S, Paxton Elizabeth W. <i>Risk Factors Associated with Deep Surgical Site Infections After Primary Total Knee Arthroplasty</i> | J BONE JOINT SURG AM | 369 (41) | 2013 | Cohort study | IV |
| 32 | Trampuz A, Hanssen AD, Osmon DR, Mandrekar J, Steckelberg JM, Patel R. <i>Synovial fluid leukocyte count and differential for the diagnosis of prosthetic knee infection</i> | AM J MED | 365 (20.3) | 2004 | Cohort study | IV |
| 33 | Busch CA, Shore BJ, Bhandari R, Ganapathy S, MacDonald SJ, Bourne RB, Rorabeck CH, McCalden RW. <i>Efficacy of periarticular multimodal drug injection in total knee arthroplasty - A randomized trial</i> | J BONE JOINT SURG AM | 361 (22.6) | 2006 | Randomized controlled trial | II |
| 34 | Wong Jean, Abrishami Amir, El Beheiry Hossam, Mahomed Nizar N, Davey J Roderick, Gandhi Rajiv, Syed Khalid A, Hasan Syed Muhammad Ovais, De Silva Yoshani, Chung Frances. <i>Topical Application of Tranexamic Acid Reduces Postoperative Blood Loss in Total Knee Arthroplasty A Randomized, Controlled Trial</i> | J BONE JOINT SURG AM | 354 (29.5) | 2010 | Randomized controlled trial | II |
| 35 | Ritter Merrill A, Davis Kenneth E, Meding John B, Pierson Jeffery L, Berend Michael E, Malinzak Robert A. <i>The Effect of Alignment and BMI on Failure of Total Knee Replacement</i> | J BONE JOINT SURG AM | 352 (32) | 2011 | Cohort study | IV |
| 36 | Losina Elena, Thornhill Thomas S, Rome Benjamin N, Wright John, Katz Jeffrey N. <i>The Dramatic Increase in Total Knee Replacement Utilization Rates in the United States Cannot Be Fully Explained by Growth in Population Size and the Obesity Epidemic</i> | J BONE JOINT SURG AM | 345 (34.5) | 2012 | Case series | VI |
| 37 | Escobar A, Quintana J M, Bilbao A, Arostegui I, Lafuente I, Vidaurreta I. <i>Responsiveness and clinically important differences for the WOMAC and SF-36 after total knee replacement</i> | OSTEOARTHRO CARTILAGE | 342 (22.8) | 2007 | Case series | VI |
| 38 | Mason J Bohannon, Fehring Thomas K, Estok Rhonda, Banel Deirdre, Fahrback Kyle. <i>Meta-Analysis of Alignment Outcomes in Computer-Assisted Total Knee Arthroplasty Surgery</i> | J ARTHRO-PLASTY | 341 (22.7) | 2007 | Meta-analysis | III |
| 39 | Skou Soren T, Roos Ewa M, Laursen Mogens B, Rathleff Michael S, Arendt-Nielsen Lars, Simonsen Ole, Rasmussen Sten. <i>A Randomized, Controlled Trial of Total Knee Replacement</i> | NEW ENGL J MED | 331 (47.3) | 2015 | Randomized controlled trial | II |
| 40 | Liddle Alexander D, Judge Andrew, Pandit Hemant, Murray David W. <i>Adverse outcomes after total and unicompartmental knee replacement in 101 330 matched patients: a study of data from the National Joint Registry for England and Wales</i> | LANCET | 326 (40.8) | 2014 | Non-randomised controlled study | III |

The top 100 most-cited total knee arthroplasty publications

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|----|---|----------------------|------------|------|-----------------------------|-----|
| 41 | Matziolis Georg, Krockner Doerte, Weiss Ulrike, Tohtz Stephan, Perka Carsten. <i>A prospective, randomized study of computer-assisted and conventional total knee arthroplasty - Three-dimensional evaluation of implant alignment and rotation</i> | J BONE JOINT SURG AM | 323 (21.5) | 2007 | Randomized controlled trial | II |
| 42 | Mizner RL, Petterson SC, Snyder-Mackler L. <i>Quadriceps strength and the time course of functional recovery after total knee arthroplasty</i> | J ORTHOP SPORT PHYS | 323 (19) | 2005 | Case series | VI |
| 43 | Sehat KR, Evans R, Newman JH. <i>How much blood is really lost in total knee arthroplasty? - Correct blood loss management should take hidden loss into account</i> | KNEE | 321 (14.6) | 2000 | Case series | VI |
| 44 | Good L, Peterson E, Lisander B. <i>Tranexamic acid decreases external blood loss but not hidden blood loss in total knee replacement</i> | BRIT J ANAESTH | 314 (16.5) | 2003 | Randomized controlled trial | II |
| 45 | Mizner RL, Petterson SC, Stevens JE, Vandenborne K, Snyder-Mackler L. <i>Early quadriceps strength loss after total knee arthroplasty - The contributions of muscle atrophy and failure of voluntary muscle activation</i> | J BONE JOINT SURG AM | 313 (18.4) | 2005 | Case series | VI |
| 46 | Rand JA, Trousdale RT, Ilstrup DM, Harmsen WS. <i>Factors affecting the durability of primary total knee prostheses</i> | J BONE JOINT SURG AM | 305 (16.1) | 2003 | Cohort study | IV |
| 47 | Paul James E, Arya Aman, Hurlburt Lindsay, Cheng Ji, Thabane Lehana, Tidy Antonella, Murthy Yamini. <i>Femoral Nerve Block Improves Analgesia Outcomes after Total Knee Arthroplasty A Meta-analysis of Randomized Controlled Trials</i> | ANESTHESIOLOGY | 304 (25.3) | 2010 | Meta-analysis | III |
| 48 | Lassen M R, Davidson B L, Gallus A, Pineo G, Ansell J, Deitchman D. <i>The efficacy and safety of apixaban, an oral, direct factor Xa inhibitor, as thromboprophylaxis in patients following total knee replacement</i> | J THROMB HAEMOST | 304 (20.3) | 2007 | Randomized controlled trial | II |
| 49 | Jansen Esa, Huhtala Heini, Puolakka Timo, Moilanen Teemu. <i>Risk Factors for Infection After Knee Arthroplasty A Register-Based Analysis of 43,149 Cases</i> | J BONE JOINT SURG AM | 302 (23.2) | 2009 | Cohort study | IV |
| 50 | Choong Peter F, Dowsey Michelle M, Stoney James D. <i>Does Accurate Anatomical Alignment Result in Better Function and Quality of Life? Comparing Conventional and Computer-Assisted Total Knee Arthroplasty</i> | J ARTHROPLASTY | 300 (23.1) | 2009 | Randomized controlled trial | II |
| 51 | Dennis DA, Komistek RD, Mahfouz MR, Haas BD, Stiehl JB. <i>Multicenter determination of in vivo kinematics after total knee arthroplasty</i> | CLIN ORTHOP RELAT R | 297 (15.6) | 2003 | Cohort study | IV |
| 52 | Yang Zhi-Gao, Chen Wei-Ping, Wu Li-Dong. <i>Effectiveness and Safety of Tranexamic Acid in Reducing Blood Loss in Total Knee Arthroplasty: A Meta-Analysis</i> | J BONE JOINT SURG AM | 296 (29.6) | 2012 | Meta-analysis | III |
| 53 | Weinstein Alexander M, Rome Benjamin N, Reichmann William M, Collins Jamie E, Burbine Sara A, Thornhill Thomas S, Wright John, Katz Jeffrey N, Losina Elena. <i>Estimating the Burden of Total Knee Replacement in the United States</i> | J BONE JOINT SURG AM | 291 (32.3) | 2013 | Economic study | VI |
| 54 | Bauwens Kai, Matthes Gerrit, Wich Michael, Gebhard Florian, Hanson Beate, Ekkernkamp Axel, Stengel Dirk. <i>Navigated total knee replacement - A meta-analysis</i> | J BONE JOINT SURG AM | 291 (19.4) | 2007 | Meta-analysis | III |
| 55 | Mahomed NN, Barrett J, Katz JN, Baron JA, Wright J, Losina E. <i>Epidemiology of total knee replacement in the United States Medicare population</i> | J BONE JOINT SURG AM | 291 (17.1) | 2005 | Cohort study | IV |
| 56 | Buvanendran Asokumar, Kroin Jeffrey S, Della Valle Crai J, Kari Maruti, Moric Mario, Tuman Kenneth J. <i>Perioperative Oral Pregabalin Reduces Chronic Pain After Total Knee Arthroplasty: A Prospective, Randomized, Controlled Trial</i> | ANESTH ANALG | 287 (23.9) | 2010 | Randomized controlled trial | II |
| 57 | Vendittoli PA, Makinen P, Drolet P, Lavigne M, Fallaha M, Guertin MC, Varin F. <i>A multimodal analgesia protocol for total knee arthroplasty - A randomized, controlled study</i> | J BONE JOINT SURG AM | 287 (17.9) | 2006 | Randomized controlled trial | II |
| 58 | Kerkhoffs Gino M M J, Servien Elvire, Dunn Warren, Dahm Diane, Bramer Jos A M, Haverkamp Daniel. <i>The Influence of Obesity on the Complication Rate and Outcome of Total Knee Arthroplasty A Meta-Analysis and Systematic Literature Review</i> | J BONE JOINT SURG AM | 283 (28.3) | 2012 | Meta-analysis | III |
| 59 | Ritter MA, Harty LD, Davis KF, Meding JB, Berend MF. <i>Predicting range of motion after total knee arthroplasty - Clustering, log-linear regression, and regression tree analysis</i> | J BONE JOINT SURG AM | 280 (14.7) | 2003 | Cohort study | IV |
| 60 | Noble PC, Gordon MJ, Weiss JM, Reddix RN, Conditt MA, Mathis KB. <i>Does total knee replacement restore normal knee function?</i> | CLIN ORTHOP RELAT R | 278 (16.4) | 2005 | Case series | VI |
| 61 | Pugely Andrew J, Martin Christopher T, Gao Yubo, Mendoza-Lattes Sergio, Callaghan John J. <i>Differences in Short-Term Complications Between Spinal and General Anesthesia for Primary Total Knee Arthroplasty</i> | J BONE JOINT SURG AM | 277 (30.8) | 2013 | Cohort study | IV |

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|----|--|-----------------------|------------|------|-----------------------------|-----|
| 62 | Alshryda S, Sarda P, Sukeik M, Nargol A, Blenkinsopp J, Mason J M. <i>Tranexamic acid in total knee replacement A systematic review and meta-analysis</i> | J BONE JOINT SURG BR | 272 (24.7) | 2011 | Meta-analysis | III |
| 63 | Stevens JE, Mizner RL, Snyder-Mackler L. <i>Quadriceps strength and volitional activation before and after total knee arthroplasty for osteoarthritis</i> | J ORTHOPAED RES | 271 (14.3) | 2003 | Case series | VI |
| 64 | Bullens PHJ, van Loon CJM, Malefijt MCD, Laan RFJM, Veth RPH. <i>Patient satisfaction after total knee arthroplasty - A comparison between subjective and objective outcome assessments</i> | J ARTHROPLASTY | 270 (12.9) | 2001 | Case series | VI |
| 65 | Mancuso CA, Sculco TP, Wickiewicz TL, Jones EC, Robbins L, Warren RF, Williams-Russo P. <i>Patients' expectations of knee surgery</i> | J BONE JOINT SURG AM | 269 (12.8) | 2001 | Case series | VI |
| 66 | Stulberg SD, Loan P, Sarin V. <i>Computer-assisted navigation in total knee replacement: Results of an initial experience in thirty-five patients</i> | J BONE JOINT SURG AM | 267 (13.4) | 2002 | Case series | VI |
| 67 | Lewis G N, Rice D A, McNair P J, Kluger M. <i>Predictors of persistent pain after total knee arthroplasty: a systematic review and meta-analysis</i> | BRIT J ANAESTH | 263 (37.6) | 2015 | Review | III |
| 68 | Haaker RG, Stockheim M, Kamp M, Proff G, Breitenfelder J, Ottersbach A. <i>Computer-assisted navigation increases precision of component placement in total knee arthroplasty</i> | CLIN ORTHOP RELAT R | 262 (15.4) | 2005 | Cohort study | IV |
| 69 | Mizner RL, Snyder-Mackler L. <i>Altered loading during walking and sit-to-stand is affected by quadriceps weakness after total knee arthroplasty</i> | J ORTHOP RES | 260 (15.3) | 2005 | Case series | VI |
| 70 | Buvanendran A, Kroin JS, Tuman KJ, Lubenow TR, Elmofly D, Moric M, Rosenberg AG. <i>Effects of perioperative administration of a selective cyclooxygenase 2 inhibitor on pain management and recovery of function after knee replacement - A randomized controlled trial</i> | JAMA-J AM MED ASSOC | 260 (13.7) | 2003 | Randomized controlled trial | II |
| 71 | Belmont Philip J Jr, Goodman Gens P, Waterman Brian R, Bader Julia O, Schoenfeld Andrew J. <i>Thirty-Day Postoperative Complications and Mortality Following Total Knee Arthroplasty</i> | J BONE JOINT SURG AM | 256 (32) | 2014 | Case series | VI |
| 72 | Francis CW, Berkowitz SD, Comp PC, Lieberman JR, Ginsberg JS, Paiement G, Peters GR, Roth AW, McElhattan J, Colwell CW. <i>Comparison of ximelagatran with warfarin for the prevention of venous thromboembolism after total knee replacement</i> | NEW ENGL J MED | 255 (13.4) | 2003 | Randomized controlled trial | II |
| 73 | Longstaff Lee M, Sloan Karen, Stamp Nikki, Bs Matt ScaddanMb, Beaver Richard. <i>Good Alignment After Total Knee Arthroplasty Leads to Faster Rehabilitation and Better Function</i> | J ARTHROPLASTY | 254 (19.5) | 2009 | Case series | VI |
| 74 | Zywiell Michael G, Stroh D Alex, Lee Seung Yong, Bonutti Peter M, Mont Michael A. <i>Chronic Opioid Use Prior to Total Knee Arthroplasty</i> | J BONE JOINT SURG AM | 250 (22.7) | 2011 | Case-control | IV |
| 75 | Akagi M, Oh M, Nonaka T, Tsujimoto H, Asano T, Hamanishi C. <i>An anteroposterior axis of the tibia for total knee arthroplasty</i> | CLIN ORTHOP RELAT R | 250 (13.9) | 2004 | Case series | VI |
| 76 | Lingard EA, Katz JN, Wright J, Wright EA, Sledge CB. <i>Validity and responsiveness of the Knee Society Clinical Rating System in comparison with the SF-36 and WOMAC</i> | J BONE JOINT SURG AM | 248 (11.8) | 2001 | Cohort study | IV |
| 77 | Brander Victoria, Gondek Stephen, Martin Emily, Stulberg S David. <i>Pain and depression influence outcome 5 years after knee replacement surgery</i> | CLIN ORTHOP RELAT R | 247 (16.5) | 2007 | Cohort study | IV |
| 78 | Bozic Kevin J, Lau Edmund, Kurtz Steven, Ong Kevin, Berry Daniel J. <i>Patient-related Risk Factors for Postoperative Mortality and Periprosthetic Joint Infection in Medicare Patients Undergoing TKA</i> | CLIN ORTHOP RELAT R | 241 (24.1) | 2012 | Cohort study | IV |
| 79 | SooHoo NF, Lieberman JR, Ko CY, Zingmond DS. <i>Factors predicting complication rates following total knee replacement</i> | J BONE JOINT SURG AM | 238 (14.9) | 2006 | Cohort study | IV |
| 80 | Weiss JM, Noble PC, Condit MA, Kohl HW, Roberts S, Cook KF, Gordon MJ, Mathis KB. <i>What functional activities are important to patients with knee replacements?</i> | CLIN ORTHOP RELAT R | 237 (11.9) | 2002 | Cohort study | IV |
| 81 | Schroer William C, Berend Keith R, Lombardi Adolph V, Barnes C Lowry, Bolognesi Michael P, Berend Michael E, Ritter Merrill A, Nunley Ryan M. <i>Why Are Total Knees Failing Today? Etiology of Total Knee Revision in 2010 and 2011</i> | J ARTHROPLASTY | 235 (26.1) | 2013 | Case series | VI |
| 82 | Inacio M C S, Paxton E W, Graves S E, Namba R S, Nemes S. <i>Projected increase in total knee arthroplasty in the United States - an alternative projection model</i> | OSTEOARTH R CARTILAGE | 234 (46.8) | 2017 | Case series | VI |
| 83 | Riddle Daniel L, Wade James B, Jiranek William A, Kong Xiangrong. <i>Preoperative Pain Catastrophizing Predicts Pain Outcome after Knee Arthroplasty</i> | CLIN ORTHOP RELAT R | 234 (19.5) | 2010 | Cohort study | IV |

The top 100 most-cited total knee arthroplasty publications

| | | | | | | |
|-----|--|----------------------|------------|------|-----------------------------|-----|
| 84 | Ng Vincent Y, DeClaire Jeffrey H, Berend Keith R, Gulick Bethany C, Lombardi Adolph V Jr. <i>Improved Accuracy of Alignment With Patient-specific Positioning Guides Compared With Manual Instrumentation in TKA</i> | CLIN ORTHOP RELAT R | 232 (23.2) | 2012 | Case series | VI |
| 85 | Howell Stephen M, Howell Stacey J, Kuznik Kyle T, Cohen Joe, Hull Maury L. <i>Does A Kinematically Aligned Total Knee Arthroplasty Restore Function Without Failure Regardless of Alignment Category?</i> | CLIN ORTHOP RELAT R | 229 (25.4) | 2013 | Case series | VI |
| 86 | Newman J, Pydisetty R V, Ackroyd C. <i>Unicompartmental or total knee replacement The 15-year results of a prospective randomised controlled trial</i> | J BONE JOINT SURG BR | 227 (17.5) | 2009 | Randomized controlled trial | II |
| 87 | Maniar Rajesh N, Kumar Gaurav, Singhi Tushar, Nayak Ravi Mohan, Maniar Parul R. <i>Most Effective Regimen of Tranexamic Acid in Knee Arthroplasty: A Prospective Randomized Controlled Study in 240 Patients</i> | CLIN ORTHOP RELAT R | 224 (22.4) | 2012 | Randomized controlled trial | II |
| 88 | Fischer H B J, Simanski C J P, Sharp C, Bonnet F, Camu F, Neugebauer E A M, Rawal N, Joshi G P, Schug S A, Kehlet H. <i>A procedure-specific systematic review and consensus recommendations for postoperative analgesia following total knee arthroplasty</i> | ANAESTHESIA | 224 (16) | 2008 | Review | III |
| 89 | Kim YH, Sohn KS, Kim JS. <i>Range of motion of standard and high-flexion posterior stabilized total knee prostheses</i> | J BONE JOINT SURG AM | 224 (13.2) | 2005 | Randomized controlled trial | II |
| 90 | Jaeger Pia, Zaric Dusanka, Fomsgaard Jonna S, Hilsted Karen Lisa, Bjerregaard Jens, Gyrn Jens, Mathiesen Ole, Larsen Tommy K, Dahl Jorgen B. <i>Adductor Canal Block Versus Femoral Nerve Block for Analgesia After Total Knee Arthroplasty A Randomized, Double-blind Study</i> | REGION ANESTH PAIN M | 216 (24) | 2013 | Randomized controlled trial | II |
| 91 | Mizner Ryan L, Petterson Stephanie C, Clements Katie E, Zeni Joseph A Jr, Irrgang James J, Snyder-Mackler Lynn. <i>Measuring Functional Improvement After Total Knee Arthroplasty Requires Both Performance-Based and Patient-Report Assessments A Longitudinal Analysis of Outcomes</i> | J ARTHROPLASTY | 215 (19.5) | 2011 | Case series | VI |
| 92 | Chelly JE, Greger J, Gebhard R, Coupe K, Clyburn TA, Buckle R, Criswell A. <i>Continuous femoral blocks improve recovery and outcome of patients undergoing total knee arthroplasty</i> | J ARTHROPLASTY | 215 (10.2) | 2001 | Cohort study | IV |
| 93 | Mahfouz MR, Hoff WA, Komistek RD, Dennis DA. <i>A robust method for registration of three-dimensional knee implant models to two-dimensional fluoroscopy images</i> | IEEE T MED IMAGING | 213 (11.2) | 2003 | Laboratory study | IV |
| 94 | Barrack RL, Bertot AJ, Wolfe MW, Waldman DA, Milicic M, Myers L. <i>Patellar resurfacing in total knee arthroplasty - A prospective, randomized, double-blind study with five to seven years of follow-up</i> | J BONE JOINT SURG AM | 212 (10.1) | 2001 | Randomized controlled trial | II |
| 95 | Clement N D, MacDonald D, Simpson A H R W. <i>The minimal clinically important difference in the Oxford knee score and Short Form 12 score after total knee arthroplasty</i> | KNEE SURG SPORT TRA | 211 (26.4) | 2014 | Cohort study | IV |
| 96 | Nilsdotter Anna K, Toksvig-Larsen Soren, Roos Ewa M. <i>Knee arthroplasty: are patients' expectations fulfilled?</i> | ACTA ORTHOP | 211 (16.2) | 2009 | Case series | VI |
| 97 | Decking R, Markmann Y, Fuchs J, Puhl W, Scharf HP. <i>Leg axis after computer-navigated total knee arthroplasty - A prospective randomized trial comparing computer-navigated and manual implantation</i> | J ARTHROPLASTY | 211 (12.4) | 2005 | Randomized controlled trial | II |
| 98 | Kim J, Nelson CL, Lotke PA. <i>Stiffness after total knee arthroplasty - Prevalence of the complication and outcomes of revision</i> | J BONE JOINT SURG AM | 211 (11.7) | 2004 | Case series | VI |
| 99 | Gunaratne Rajitha, Pratt Dylan N, Banda Joseph, Fick Daniel P, Khan Riaz J K, Robertson Brett W. <i>Patient Dissatisfaction Following Total Knee Arthroplasty: A Systematic Review of the Literature</i> | J ARTHROPLASTY | 210 (42) | 2017 | Review | III |
| 100 | Blom AW, Brown J, Taylor AH, Pattison G, Whitehouse S, Bannister GC. <i>Infection after total knee arthroplasty</i> | J BONE JOINT SURG BR | 210 (11.7) | 2004 | Case series | VI |

the years 2008, 2010, 2015 and 2017 corresponding to citation densities above 40 (Fig. 2). In total, the number of citations for these 100 publications numbered 35,599. This averaged to 355.9 ± 177.4 citations and 26.9 ± 15.6 of citation density per paper. The total number of citations for the top 100 articles ranged from 210 to 1273 (Table I). Citation density was analyzed in addition to total citation. The most-cited publication

in 2010, amassed 1,273 citations with also the most citation dense, averaging, 106.1 citations per year. The least citation-dense article with an average of 10.1 was published in 2001 with a total of 212 total citations at the time of this analysis.

The articles were also analyzed for their author, journal, and country of origin. The top three most productive and cited authors were Katz, J.N from the

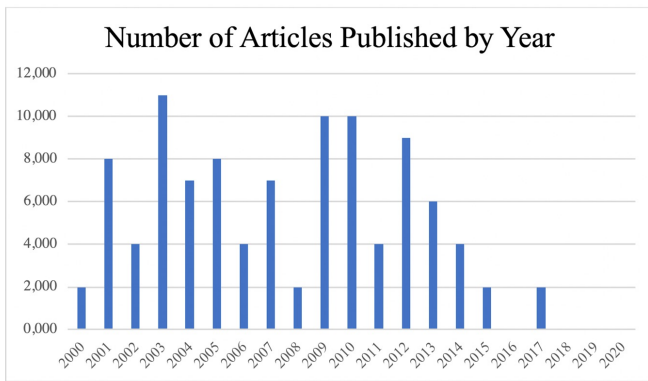


Figure 1. — Number of articles published by year.

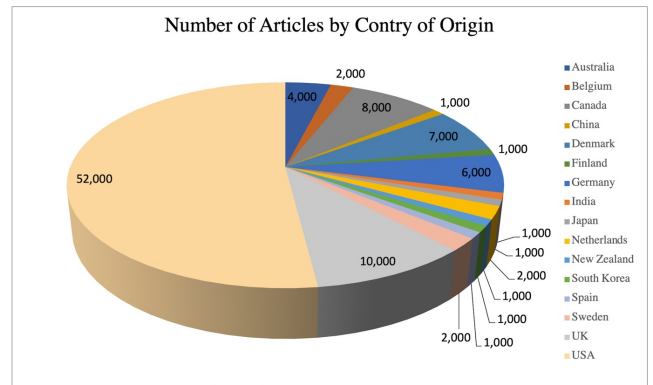


Figure 3. — Number of articles by country of origin.

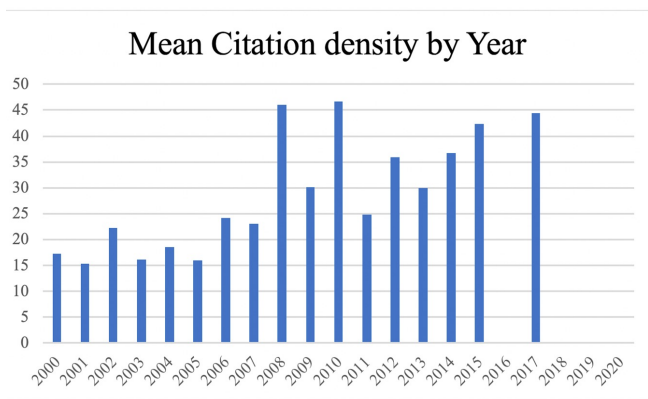


Figure 2. — Mean citation density by year.

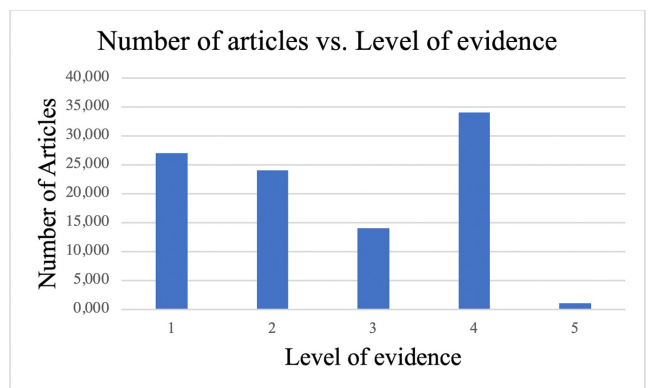


Fig. 4.

Table II. — The top Journals with frequently citations

| Rank | Journal Title | Number of Articles |
|------|--|--------------------|
| 1 | <i>Journal of Bone and Joint Surgery-American Volume</i> | 28 |
| 2 | <i>Clinical Orthopaedics and Related Research</i> | 22 |
| 3 | <i>Journal of Arthroplasty</i> | 12 |
| 4 | <i>Journal of Bone and Joint Surgery-British Volume</i> | 8 |
| 5 | <i>New England Journal of Medicine</i> | 5 |
| | TOTAL | 75 |

Harvard Medical School (Boston, USA) (6 articles), Snyder-Mackler, L from the department of physical therapy, University of Delaware (Newark, USA) (5 articles) and Lassen, M.R from the department of Orthopaedics and Clinical Trial Unit, University of Copenhagen, (Hoersholm, Denmark) (5 articles). Overall, 23 different journals were represented. The journals with the most studies from the top 100 articles

Table III. — The Study design represented in Top 100 TKA Publications

| TYPE | NUMBER OF ARTICLES |
|--|--------------------|
| Randomized Controlled Trial Level of evidence II | 23 |
| Non-randomized Controlled Trial Level of evidence III | 1 |
| Cohort study Level of evidence IV | 30 |
| Case-control study Level of evidence iv | 1 |
| Economic study Level of evidence VI | 2 |
| Review article Level of evidence III | 4 |
| Meta-analysis Level of evidence III | 6 |
| Laboratory study Level of evidence IV | 1 |

was the Journal of Bone and Joint Surgery-American Volume with 28 citations and 75 articles were published

on the top five journals (Table II). In total, there were 16 different countries of origin represented by these articles. The United States represented 52 of the 100 articles. United Kingdom was second with 10 articles and Canada third with 8 articles (Fig. 3).

There were 9 different study types represented in the 100 articles: randomized control, non-randomized controlled trial, cohort study, case series, review article, meta-analysis, case-control study, economic study and laboratory study. Of these, case series design ($n = 32$), cohort studies ($n = 30$) and randomized control trial ($n = 23$) were the most used and represented 85 articles (Table III). In addition, the levels of evidence used in the articles were reported (Fig. 4). Level IV was the most common level of evidence included in these articles with 34 articles. The next most common was Level I with 27 articles, followed by Levels II with 24 articles and level III with 14 articles.

DISCUSSION

The 100 most-cited publications on total knee arthroplasty between 2000 and 2022 were cumulatively cited more than 35,399 times with an average of 355.9 citations per article, with the most-cited publication receiving 1273 citations. In addition, most of the publications included in this analysis were from the United States ($n = 52$), were case series ($n = 32$), and had level IV evidence ($n = 34$).

The very large number of citations on the subject may show that prosthetic knee surgery is an industry-driven specialty²⁷ and that it takes an important part in orthopedic surgery research when compared to other sub-specialties: in arthroscopic surgery, the most important article was cited 567 times²⁸. In prosthetic surgery, hip arthroplasty remains the most frequent and most cited prosthetic procedure²².

In reviewing the journals, most of the articles on knee arthroplasty were published in the American volume of the *Journal of Bone and Joint Surgery*. This reflects the high reputation of this journal in the orthopaedic surgery community and its worldwide readership. The predominance of the *Journal of Bone and Joint Surgery American Volume* was also found in the analyses of the most cited orthopedic articles in general^{29,30}.

Total knee replacement is a procedure that “works” but it has been shown that only 66.1% of total knee replacements with a perfect result according to the Knee Society Score were completely forgotten in all daily activities³¹. With the ideal goal of forgetting the replaced joint, scientific research to achieve these results is even more on the agenda with the arrival of

new technologies such as custom cutting guides³², and especially the development of the navigation for which we find the most articles³³⁻³⁶. No article in the Top 100 studies robot-assisted surgery, which is most likely too new a technique to contain enough citations. These recent developments have led orthopedic surgeons to follow the evolution of publications on total knee arthroplasty.

Citation analyses can objectively identify publications that help provide valuable insight into the history and evolution of a specialized technique. The most cited literature on total knee arthroplasty should reflect the trends and growth of the technique itself. Surgeons performing this procedure can use these recent publications to review the characteristics of the most cited studies, gain a better understanding of the approach over time, and focus their research contributions. The most frequent level of evidence was level IV ($n = 34$), which corresponds to the most represented study designs: case series ($n = 32$). A similar distribution of levels of evidence and study type has been reported in other orthopedic publications^{37,38}. However, a significant proportion of Level 1 articles ($n = 27$) were found in the Top 100 most cited articles on total knee arthroplasty with 23 randomized controlled trials. Most of these were pharmaceutical studies on postoperative anticoagulant management, intraoperative anesthetic strategies, and perioperative analgesic management. Randomization in orthopedic surgery remains a difficult study design and is therefore less frequently used.

One limit of this study is the incomplete congruence between a publication’s impact and its total number of citations. Although this measure is generally representative and more objective than other means, influential articles may be overlooked. Some subjectivity was unavoidable in making final inclusion or exclusion decisions. Despite this limitation, we have reduced this subjectivity through the consensus of several authors. Although the Web of Knowledge database performs quality control, we recognize that bias can be introduced into the data by authors citing their own work or preferentially citing certain journals. However, the citations resulting from these actions likely represent only a small fraction of the total citations, given that these 100 articles were cited more than the multitude of other articles on total knee arthroplasty. With the limitations discussed, citation analysis remains a widely accepted tool for measuring the impact of a publication on the field.

CONCLUSION

The 100 most influential publications on total knee arthroplasty were cited a total of 35,399 times. The most used study designs were case series and cohort studies. This publication serves as a reference to direct orthopaedic surgeons to the 100 most influential studies on total knee arthroplasty. Most of the studies were from high impact factor journals and a quarter of these studies are high level of evidence.

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Conflicts of interest/Competing interests: Dr Ernat is a paid consultant for Johnson & Johnson Depuy Mitek Sports Medicine. He is a committee member for the Arthroscopy Association of North American and the American Orthopedic Society for Sports Medicine. He is an editorial board member for Arthroscopy Journal. Pr Gonzalez is a paid consultant for Amplitude. The other authors have no conflicts of interest. Ethics approval: The local ethics committee approved our study protocol prior to submission. The patient's consent was obtained before the article was written.

Consent to participate: Not applicable.

Consent for publication: Not applicable.

Availability of data and material: Not applicable.

Code availability: Not applicable.

Authors' contributions: B. de Geofroy and G. Micicoi writing the manuscript; A. Machado, L. Micicoi, N. Recanatesi and P. Froidefond data collection. G. Micicoi, J.-F. Gonzalez and J. Ernat data interpretation; all authors approved the final manuscript.

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