Original Article

Arthroscopic treatment of osteoarthritis: a bibliometric study

Yu Li[1], Wei Wang[2,3], Donghai Chao[4], Jiyu Chai[1], Lingyan Kong[1], Huan Zhang[1]

[1]Department of Orthopedics, Huludao Central Hospital, Huludao, China; [2]Institute of Orthopedics, Jinzhou Medical University, Jinzhou, China; [3]Department of Orthopedics, First Affiliated Hospital of Jinzhou Medical University, Jinzhou, China; [4]Joint Surgery, Second Affiliated Hospital, Dalian Medical University, Dalian, China

Contributions: (I) Conception and design: Y Li, W Wang; (II) Administrative support: D Chao; (III) Provision of study materials or patients: J Chai; (IV) Collection and assembly of data: Y Li, L Kong, H Zhang; (V) Data analysis and interpretation: Y Li, W Wang; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Wei Wang. Institute of Orthopedics, Jinzhou Medical University, Jinzhou, China. Email: weiwang_ly@126.com.

Background: Osteoarthritis is a common disease among middle-aged and older adults. The arthroscopic approach is among the less traumatic of the treatments and provides quicker recovery. The purpose of this study was to use bibliometrics analysis to clarify the current status and existing problems in the research of the arthroscopic treatment of osteoarthritis.

Methods: The Science Citation Index Expanded (SCI-E) database in the Web of Science Core Collection (WOSCC) was used as the data source for the literature search. The search terms were "osteoarthritis" and "arthroscopy", with the intersection of the search results of these 2 search terms being used. CiteSpace software used to analyze the final results of the search in the following aspects: annual publication, subject distribution, country/institution distribution, journal distribution, author distribution, and keyword usage. Finally, burst detection was applied to analyze the annual use trend of the keywords.

Results: A total of 2,738 document records were retrieved, and the frequency of citations was 82,932 times. The number of publications and the number of citations showed an obvious annual increasing trend. The country with the highest number of publications and centrality was the United States of America, and most important research institutions were from the United States. Extensive cooperation between countries and institutions was evident. The important journals in this field were mainly professional journals of orthopedics and joints. Keyword analysis showed that early research mainly focused on the technical operation of arthroscopic treatment of osteoarthritis, while the focus in recent years has been on long-term prognosis and risk prediction.

Conclusions: The application of arthroscopy in the treatment for osteoarthritis should be further explored, especially for large joints other than hip and knee joints.

Keywords: Osteoarthritis; arthroscopy; bibliometrics

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Introduction

Osteoarthritis (OA) is a kind of degenerative joint disease, which can cause local pain, swelling, and functional decline in the joints of patients, and seriously affect the quality of life of patients. This disease is more common in middle-aged and older adults, with the incidence and prevalence increasing with age (1,2). In the early stage of the disease, difficult-to-locate pain occurs in the joints and their surroundings, and local tenderness may be present. As the disease progresses, joint swelling, increased pain, decreased joint function, decreased joint weight, disuse atrophy of joint accessory muscles, osteoporosis, and decreased joint stability gradually appear (3-5). The main mechanism of OA involves the vascular disease of the subchondral bone causing local insufficiency of blood supply, which, in turn,

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leads to changes in the structure of the subchondral bone. As a consequence, the outside of the cartilage degenerates, and changes in the intra-articular environment, exudation of inflammatory mediators, synovial hyperplasia, and inflammatory manifestations of edema occur. Clinical manifestations may vary depending on the different joints involved, but issues with the knee joint and hip joint are the most common (5).

Because OA is a degenerative disease and cannot be thoroughly cured, the current principle of treatment is to control or reduce inflammation, relieve pain, and improve joint function (6,7). Treatment strategies include surgery, medication, and rehabilitation physiotherapy (6). Surgery includes open surgery and arthroscopic minimally invasive surgery, the main purpose of which is to flush and remove the diseased tissue in the joint or to reconstruct the joint to achieve partial recovery (6). Drug therapy and rehabilitation physiotherapy are mainly applied to reduce inflammation, relieve pain, and increase the function of joints and their accessory structures (6). Arthroscopy is a minimally invasive surgery using endoscopy technology in diagnosing and treatment of joint disease, and is widely used in patients with severe OA. Under arthroscopy, joint debridement, chondroplasty, and ligament lysis can be performed (8). Arthroscopic treatment of OA can not only slow down the degeneration of cartilage and the progression of the disease, but also decrease the release of inflammatory factors, reduce the pain caused by mechanical factors, and restore joint function to a certain extent. Within its long period of clinical application, arthroscopy has been able to examine and treat multiple large joints, including shoulder joints, elbow joints, wrist joints, hip joints, knee joints, and ankle joints. As OA mainly involves weight-bearing joints, arthroscopy is the most widely used approach in hip and knee joint diseases, especially the knee joint (8,9).

With the continuous development of arthroscopy in clinical practice, there has also been a corresponding enrichment in the literature in this field. It is thus necessary to analyze the current state of research related to the application of arthroscopy in OA. Some previous reviews summarized the advances and status of specific theme in the field of arthroscopic management of OA, but not overview on where these research came from or who did these work, or information about literatures (8,10). This study adopted the bibliometric method (11) to analyze the literature in the field of arthroscopic management of OA, depict the status of related research from a macroperspective, and provide references for researchers.

Methods

Literature search

Similar to other bibliometric studies (12,13), we searched for literature using the Science Citation Index Expanded (SCI-E) database in the Web of Science Core Collection (WOSCC) as the data source. Literature was searched from the earliest time included in the database to the most recent search time of this study (August 22, 2021). A topic search strategy was used, with the search terms being "osteoarthritis" and "arthroscopy", and the intersection of the retrieval results of these 2 terms was collected.

Data analysis

The full record of the search results and the cited references was exported in text format. CiteSpace software was used to remove duplicate records. Information including annual publication status, subject distribution, country/institution distribution, journal distribution, author, and the use of keywords were then separately analyzed. Finally, burst detection was applied to analyze the annual trend in the use of keywords.

Statistical analysis

In this study, the current status of research in the field of the arthroscopic treatment of OA was analyzed. There was no comparison between groups and no analysis of influencing factors. Therefore, no P value was established. The analysis results are expressed in quantity and percentage (n, %).

Results

General information

A total of 2,862 document records were retrieved in SCI-E using the topic terms "osteoarthritis" and "arthroscopy", 124 duplicate records were removed, and final number of documents analyzed was 2,738 (*Tables 1*,*2*, *Figure 1*). From *Table 2* and *Figure 1*, it can be seen that the number of documents published in this field basically shows an increasing trend year by year. These documents have been cited 82,932 times (*Figure 2*), the average number of citations for each piece of literature is 30.29, the h index is 125, and the number of citations also shows a significant increase each year. Among these articles, there are 2,400 original articles, showing that research in this topic is

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Table 1 Document type analysis of search results

Literature type	Records	% of 2,738
Article	2,400	87.66
Review	240	8.77
Proceedings paper	14	0.51
Editorial material	70	2.56
Letter	11	0.40
Book chapter	2	0.07
Note	1	0.04

very active. Among the other document types, there are 240 reviews, 77 proceedings papers, 70 editorial materials, 11 letters, 2 book chapters, and 1 note.

Country and institution distribution of document source

CiteSpace V software was used to analyze the characteristics of the country and institution of the document source and to generate a national visualization map and an institution visualization map. A seen in *Figure 3*, the number of nodes in the country visualization map is 90; that is, in the 2,738 documents, there are a total of 90 countries represented. The number of connections is 362; that is, the number of times any 2 countries appear in the same document is 362 times, and this represents the cooperation between these 2 countries in this document. Similarly, the number of nodes in the organization visualization map is 753; that is, in the 2,738 documents, there are 753 organizations involved, but the number of connections between the organizations is only 629, suggesting that some studies have only 1 to 2 related institutions (*Figure 4*). Further analysis of the publication situation of various countries revealed that the country with the largest number of publications was the United States, followed by Germany, the United Kingdom, China, and Canada (*Table 3*), with the number of publications in the United States being far greater than that of any other country. The United States also ranked highest in the centrality score, reflecting the frequency of external cooperation, followed by Canada, France, the United Kingdom, and Sweden, suggesting that the United States is in a leading position

Table 2 Annual change in the number of publications

Years	Records	% of 2,738
2021	134	4.89
2020	236	8.62
2019	216	7.89
2018	211	7.71
2017	197	7.20
2016	189	6.90
2015	170	6.21
2014	175	6.39
2013	129	4.71
2012	115	4.20
2011	111	4.05
2010	98	3.58
2009	73	2.67
2008	92	3.36
2007	66	2.41
2006	68	2.48
2005	67	2.45
2004	45	1.64
2003	68	2.48
2002	30	1.10
2001	29	1.06
2000	24	0.88
1999	38	1.39
1998	34	1.24
1997	29	1.06
1996	32	1.17
1995	20	0.73
1994	16	0.58
1993	7	0.26
1992	10	0.37
1991	6	0.22
1990	1	0.04
1983	2	0.07

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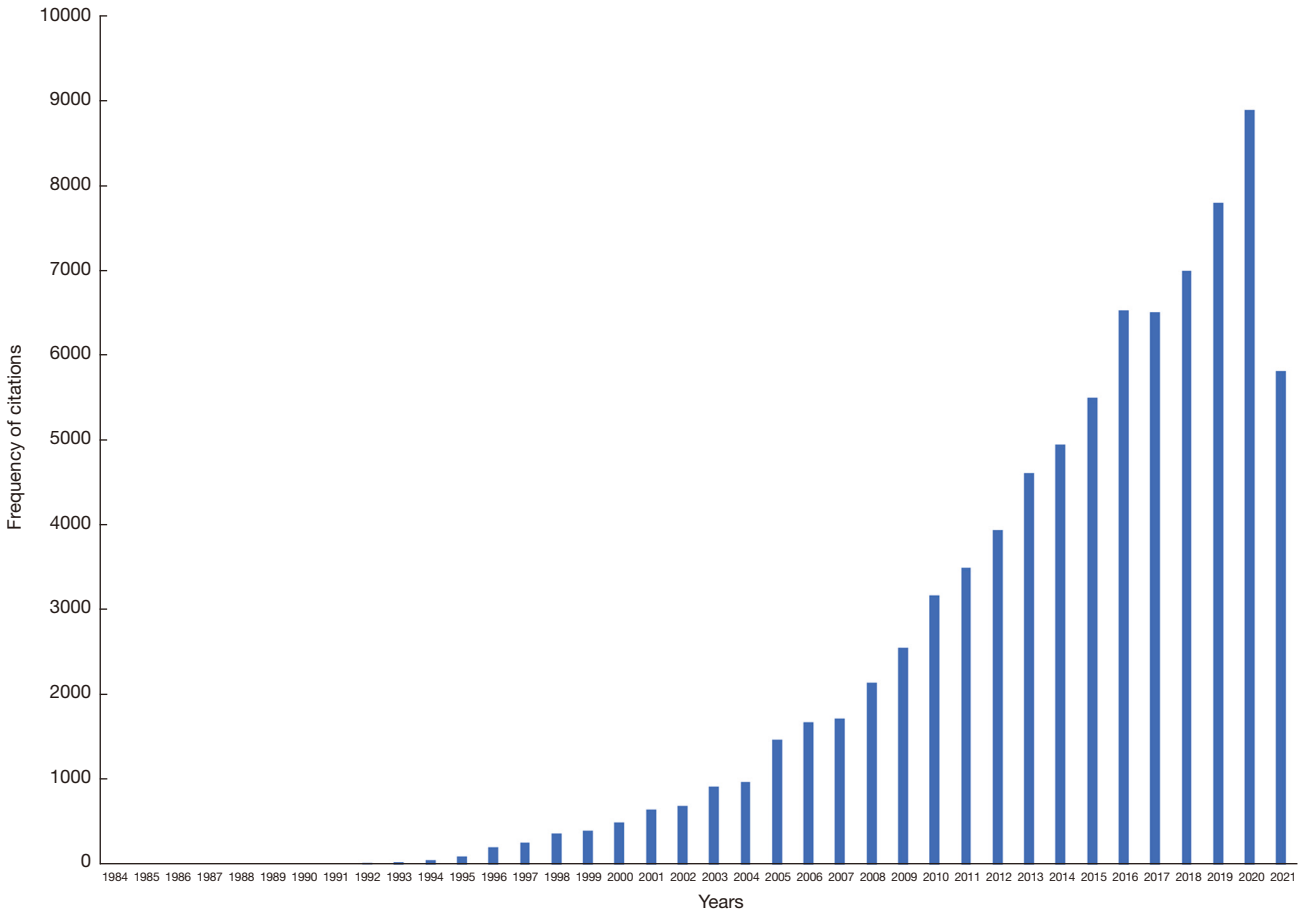

Figure 1 Annual trends in the number of publications.

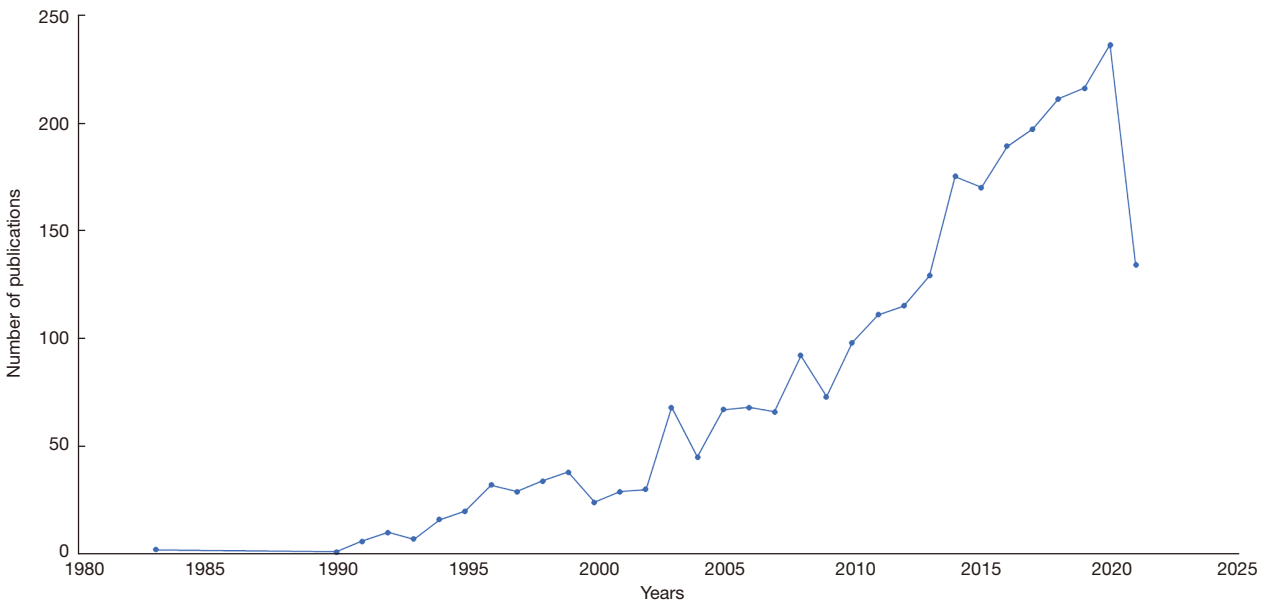

Figure 2 Annual changes of citations.

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Figure 3 A visualization map of countries. The circles and dots in the figure represent countries, and the curve represents that 2 countries were involved in the same research project (i.e., cooperative relationship). The larger the circle, the more extensive is the cooperation between the given countries.

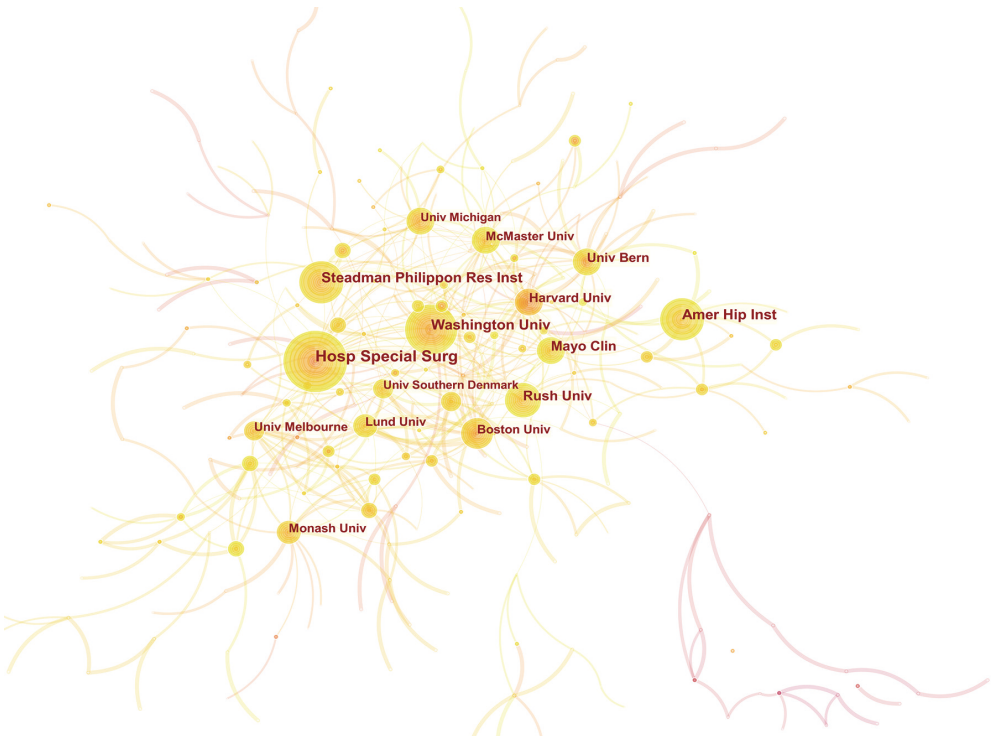

Figure 4 Visualization map of institutions. The circles and dots in the figure represent organizations, and the curve represents that 2 institutions were involved in the same research project (i.e., cooperative relationship). The larger the circle, the more extensive is the cooperation between the given institutions.

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Table 3 Top 10 countries in the number of publications

Rank	Countries	Publications
1	USA	1,009
2	Germany	243
3	England	200
4	China	145
5	Canada	139
6	Japan	138
7	Australia	136
8	France	128
9	Switzerland	127
10	South Korea	103

Table 4 Top 10 countries by centrality

Rank	Countries	Centrality
1	USA	0.58
2	Canada	0.20
3	France	0.16
4	England	0.15
5	Sweden	0.13
6	Germany	0.12
7	Australia	0.11
8	Switzerland	0.10
9	Italy	0.10
10	Austria	0.08

Table 5 Top 10 institutions in the number of publications

Rank	Institutions	Publications
1	Hospital of Special Surgery	82
2	American Hip Institute	53
3	Steadman Philippon Research Institutes	51
4	Washington University	50
5	Mayo Clinic	43
6	Rush University	41
7	University of Bern	37
8	Harvard University	35
9	Lund University	32
10	McMaster University	32

Table 6 Top 10 institutions by centrality

Rank	Institutions	Centrality
1	Hospital of Special Surgery	0.08
2	McMaster University	0.04
3	Rush University	0.03
4	University Michigan	0.03
5	New York University	0.03
6	Washington University	0.02
7	University of Bern	0.02
8	Harvard University	0.02
9	Monash University	0.02
10	University of Melbourne	0.02

in research in this field in the international arena (*Table 4*). The institution with the largest number of publications was the Hospital of Special Surgery (the hospital is the oldest orthopedic hospital in the United States, has an international reputation, and is ranked first in the United States for orthopedics), followed by the American Hip Institute, the Steadman Philippon Research Institute, Washington University, and the Mayo Clinic, which are all located in the United States (*Table 5*). Among the top 5 institutions in centrality, only McMaster University in Canada was not from the United States (*Table 6*). Collectively, these results clearly show that the majority of prominent research in the field of arthroscopic treatment is being produced by institutes in the United States.

Author analysis

The analysis shows that the author with the largest number of publications was Domb, who published 62 related papers. Domb previously worked at the Hospital of Special Surgery and currently practices at the American Hip Institute. The number of publications and work trajectories indicate that Domb is an influential researcher in this field. Other authors with a large number of publications are shown in *Table 7* and *Figure 5*. However, although the number of papers published by these authors is relatively large, the centrality score reflecting cooperation did not reach 0.01, indicating that the degree of cooperation between the authors is not high. Among all authors, the top 5

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authors in cocitations are Ganz, Philippon, Byrd, Beck, and Outerbridge (*Table 8*). Although Ganz has not published the most number papers in this field, his published works constitute the seminal research in this field. The top 5 authors in cocitation centrality are Outerbridge, Bellamy, Kellgren, Ito, and Kelly, with Outerbridge being more of an earlier researcher (*Table 9*, *Figure 6*).

Table 7 Top 10 authors in the number of publications

Rank	Authors	Publications
1	Domb BG	62
2	Philippon MJ	43
3	Kelly BT	35
4	Clohisy JC	29
5	Nho SJ	26
6	Bedi A	25
7	Briggs KK	23
8	Krych AJ	21
9	Maldonado DR	19
10	Kim Y	17

Journal analysis

The 2,738 articles were retrieved from 417 journals, of which 16 published more than 30 articles each (*Table 10*). These 16 journals have published 1,256 related papers, accounting for 45.87% of the total literature (*Table 10*). Moreover, this group of journals are all top journals in orthopedics, particularly in the field of joints and arthroscopy. The most cited journal was *Arthroscopy* (*Table 11*). The journal with the highest centrality score was *Instructional Course Lectures*, which is a professional journal of the American Academy of Orthopaedic Surgeons (AAOS) and only publishes 1 issue a year, covering important issues in this field (*Table 12*).

Keyword analysis

CiteSpace V software was employed to analyze keyword usage and to generate a keyword co-occurrence visualization map (*Figure 7*). There are 551 nodes in the graph in *Figure 7*; that is, there are 551 keywords used in the literature in this field. The number of simultaneous appearances of any 2 keywords in a single document is 1993. The top 5 keywords in terms of frequency are

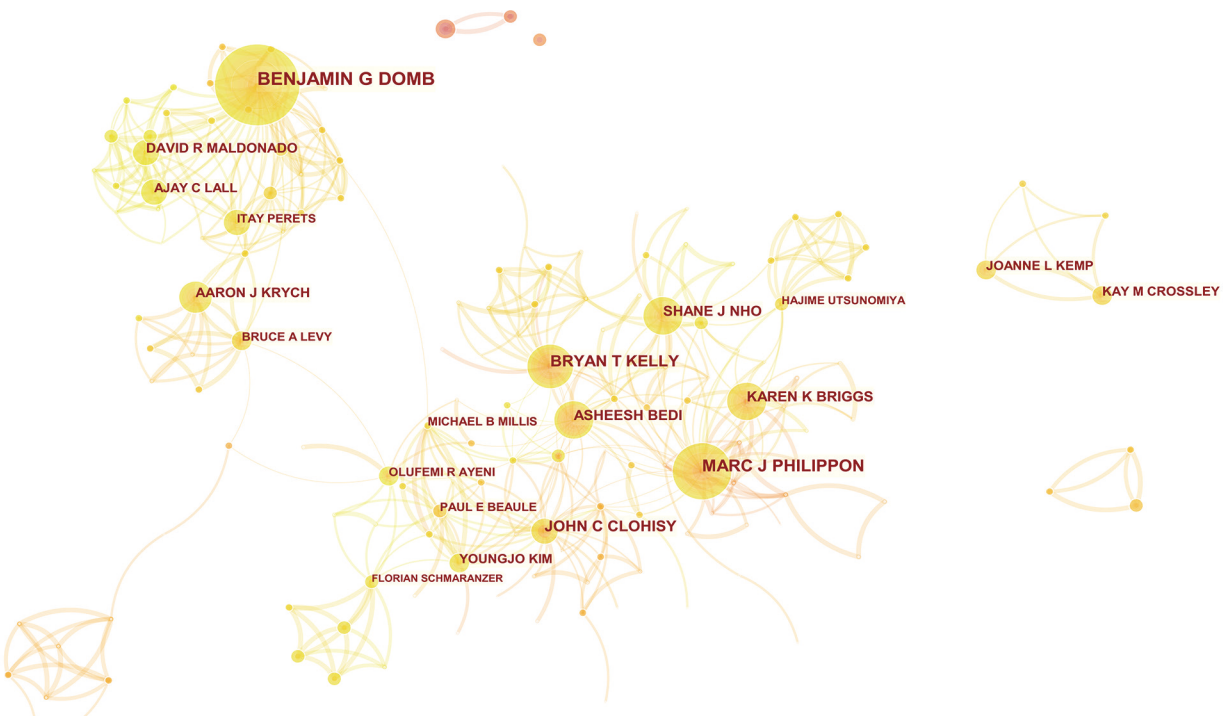

Figure 5 Visualization map of coauthors.

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"osteoarthritis", "arthroscopy", "knee", "femoroacetabular impingement", and "hip arthroscopy" (*Table 13*). The keyword for the central score is "articular cartilage", which is consistent with the effect of arthroscopy in the treatment of OA (*Table 14*). We further used CiteSpace for burst detection (*Figure 8*) to find keywords with a high frequency of use. We found that early research mainly focused on the technical operation of arthroscopic treatment of OA, while the focus in recent years has been on long-term prognosis and risk prediction.

Table 8 Top 10 authors by cocitation

Rank	Authors	Frequency
1	Ganz R	582
2	Philippon MJ	495
3	Byrd JWT	454
4	Beck M	400
5	Outerbridge RE	308
6	Clohisy JC	290
7	Larson CM	286
8	Brittberg M	251
9	Kellgren JH	235
10	Tonnis D	232

Table 9 Top 10 authors by centrality of cocitation

Rank	Authors	Centrality
1	Outerbridge RE	0.32
2	Bellamy N	0.16
3	Kellgren JH	0.15
4	Ito K	0.12
5	Kelly BT	0.12
6	Burman MS	0.10
7	Mankin HJ	0.09
8	Englund M	0.08
9	Mccarthy JC	0.08
10	Altman RD	0.07

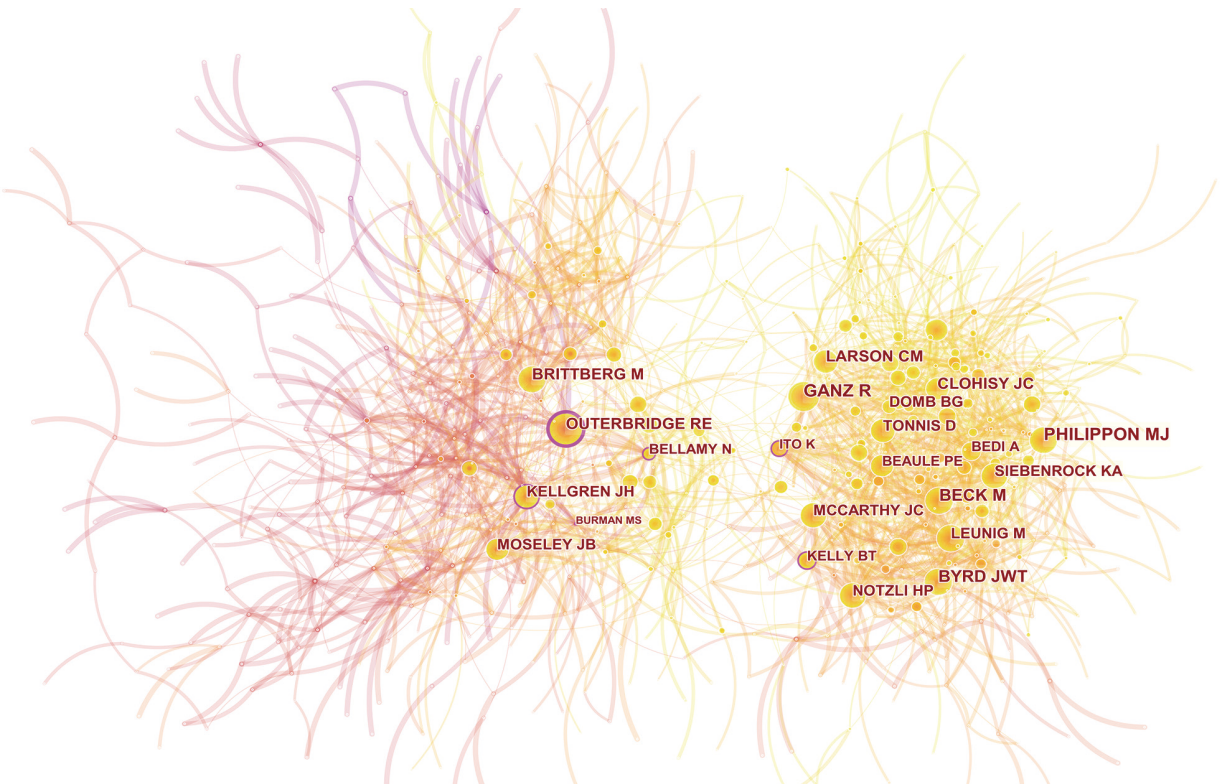

Figure 6 Visualization map of cocitation.

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Table 10 Journals with more than 30 articles published

Journals	Publications	% of 2,738
Arthroscopy	288	10.52
American Journal of Sports Medicine	189	6.90
Knee Surgery Sports Traumatology Arthroscopy	162	5.92
Osteoarthritis and Cartilage	88	3.21
Clinical Orthopaedics and Related Research	84	3.07
Journal of Bone and Joint Surgery - American Volume	59	2.15
Orthopaedics & Traumatology – Surgery & Research	53	1.94
Archives of Orthopaedic and Trauma Surgery	44	1.61
Knee	44	1.61
BMC Musculoskeletal Disorders	38	1.39
Orthopaedic Journal of Sports Medicine	37	1.35
Hip International	36	1.31
International Orthopaedics	35	1.28
Journal of Hip Preservation Surgery	35	1.28
Journal of Arthroplasty	33	1.21
Arthritis and Rheumatism	31	1.13

Table 11 Top 10 journals by citation

Rank	Journals	Citation
1	*Arthroscopy*	2,013
2	*Journal of Bone and Joint Surgery-American Volume*	1,959
3	*Clinical Orthopaedics and Related Research*	1,805
4	*American Journal of Sports Medicine*	1,695
5	*Journal of Bone and Joint Surgery-British Volume*	1,578
6	*Knee Surgery Sports Traumatology Arthroscopy*	1,088
7	*Osteoarthritis and Cartilage*	998
8	*Annals of Rheumatic Disease*	812
9	*Radiology*	562
10	*Arthritis and rheumatism*	558

Table 12 Top 10 journals by centrality of citation

Rank	Journals	Centrality
1	*AAOS: Instructional Course Lectures*	0.06
2	*American Journal of Sports Medicine*	0.05
3	*Clinical and Experimental Rheumatology*	0.05
4	*Acta Radiologica: Diagnosis*	0.05
5	*Lancet*	0.04
6	*Acta Orthopaedica Belgica*	0.04
7	*Seminars in Arthritis and Rheumatism*	0.04
8	*British Medical Journal*	0.04
9	*Clinical Rheumatology*	0.04
10	*British Journal of Rheumatology*	0.04

AAOS, American Academy of Orthopaedic Surgeons.

Discussion

The results of this study provide an overview of the research in the field of arthroscopic treatment of OA. The number of research documents in this field and the number of citations point to a significant increase in publication over the past three decades. A large amount of research is mainly concentrated in developed countries in Europe and the United States, and several well-known research institutions and researchers in the United States have conducted the bulk of the important research, with the main research authors including Domb and others. International cooperation is also mainly led by the United States. For journals, investigators should focus on professional journals on joints and arthroscopy to get high quality research information. Keyword analysis suggests that current research focuses on the long-term prognosis and risk prediction of the arthroscopic treatment of OA.

As a minimally invasive diagnosis and treatment method, arthroscopy is widely used. With the advancement of materials science and endoscope production technology, arthroscopy has seen a greater definition in the field of view and increasing flexibility in operation. Large joints of the limbs (including the shoulder, elbow, wrist, hip, knee, and ankle) can be examined and treated (10,14-19). Arthroscopy has a wide range of indications, with slight injury and scars caused by surgery, and low risk of infection under strict aseptic conditions (20,21). The overall risk of the operation is low, repeatable, and has no obvious impact on other future operations (22,23). With arthroscopic technology,

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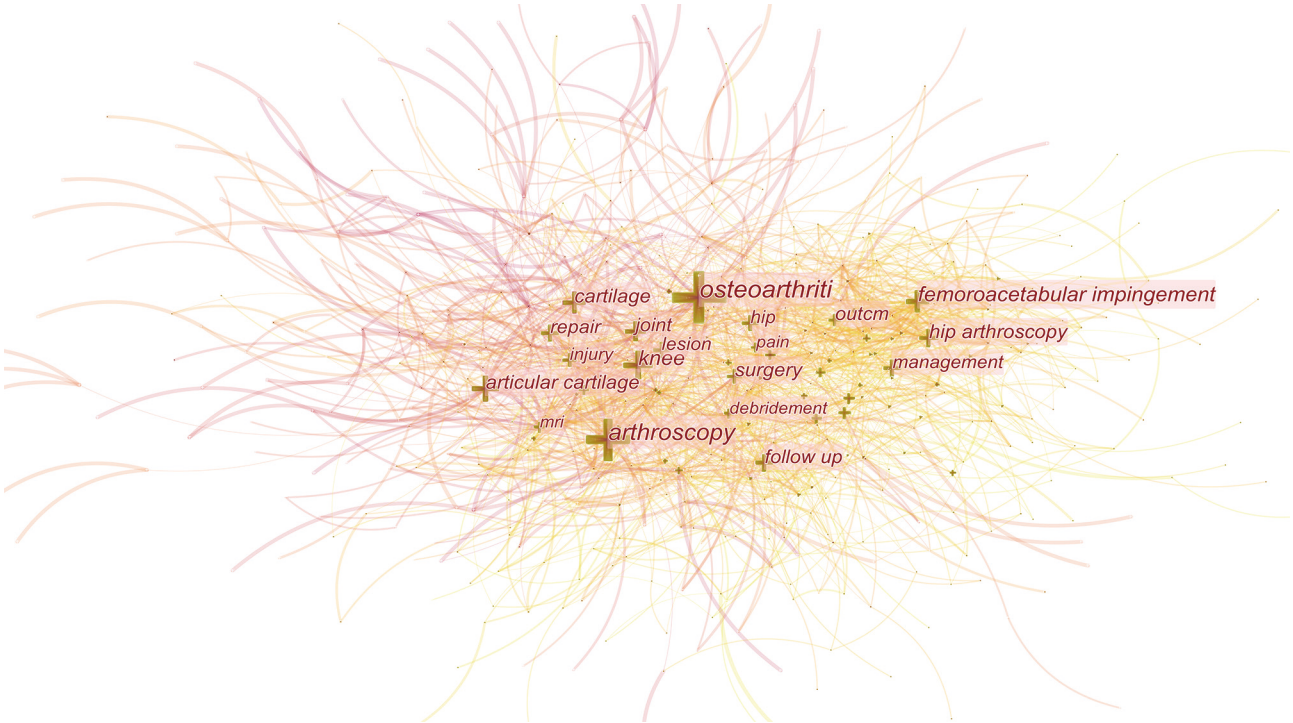

Figure 7 Visualization map of keywords.

Table 13 Top 10 keywords by frequency

Rank	Keywords	Frequency
1	Osteoarthritis	1,599
2	Arthroscopy	1,026
3	Knee	536
4	Femoroacetabular impingement	517
5	Hip arthroscopy	356
6	Articular cartilage	335
7	Surgery	311
8	Cartilage	302
9	Follow up	283
10	Joint	263

Table 14 Top 10 keywords by centrality

Rank	Keywords	Centrality
1	Articular cartilage	0.16
2	Cartilage	0.11
3	Osteoarthritis	0.09
4	Knee	0.09
5	Hip	0.09
6	Arthritis	0.09
7	MRI	0.08
8	Osteo arthritis	0.08
9	Rheumatoid arthritis	0.07
10	Accuracy	0.07

MRI, magnetic resonance imaging.

multiple operations or treatments can be performed at the same time, including joint debridement, joint cavity irrigation, meniscus resection or plasty, worn cartilage repair, and intra-articular injection (14-19). It should be noted that, as a diagnostic technique, arthroscopy can make a clear diagnosis while being minimally invasive. However, as a treatment method, for OA, arthroscopy can often only provide preservative treatment to improve the patient's joint function and relieve pain, but cannot prevent the progression of the degenerative disease (10). Arthroscopic surgery of the knee, the most common type of arthroscopy applied, can still only clean the hyperplastic synovium and cartilage debris, and remove inflammatory factors to

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Top 25 keywords with the strongest citation bursts

Keywords	Year	Strength	Begin	End	1983–2021
osteo arthriti	1983	24.1	**1990**	2005	
rheumatoid arthriti	1983	16.76	**1990**	2008	
arthroscopy	1983	13.54	**1994**	2000	
joint	1983	8.32	**1994**	2006	
articular cartilage	1983	15.54	**1995**	2004	
knee	1983	20.76	**1998**	2005	
abnormality	1983	8.28	**1998**	2012	
head	1983	10.84	**2004**	2013	
anatomy	1983	8.46	**2005**	2009	
adult hip	1983	10.23	**2006**	2013	
femoro acetabular impingement	1983	13.52	**2007**	2013	
retroversion	1983	11.74	**2007**	2013	
early osteoarthriti	1983	10.53	**2007**	2013	
surgical treatment	1983	8.18	**2011**	2017	
2 year follow up	1983	9.6	**2014**	2018	
prevalence	1983	8.59	**2015**	2017	
united states	1983	9.88	**2016**	2018	
metaanalysis	1983	8.7	**2016**	2018	
outcm	1983	25.64	**2018**	2021	
clinical outcm	1983	12.68	**2018**	2021	
trend	1983	10.16	**2018**	2021	
risk	1983	9.42	**2018**	2021	
predictor	1983	8.7	**2018**	2021	
deformity	1983	8.56	**2018**	2021	
score	1983	9.73	**2019**	2021	

Figure 8 Top 25 keywords with the strongest citation bursts.

improve the clinical function of the knee joint, but it cannot cure knee OA nor can it prevent the progress of this kind of degenerative disease; rather, its main effect is to reduce the knee pain of patients with OA, restore joint flexion function, and improve the patients' living standards and quality of life (24). The effect of arthroscopic debridement on the knee of OA patients with clinical symptoms of mechanical noose is the most satisfactory, especially for patients with related diseases such as synovial hyperplasia, meniscus tear, and loose bodies of cartilage. The unique advantages of debridement surgery are more obvious than are those of nonsurgical treatments (24). Degenerative cartilage fragments in the joints, inflammatory hyperplasia and edema of synovial tissue, and hyperplasia of osteophytes can be removed to the maximum extent during arthroscopic debridement. This relieves the joint noose symptoms caused by the proliferation of cartilage fragments and the proliferation of the noose. The meniscus that is damaged and torn can be trimmed and formed. It not only reduces the abrasion and degeneration speed of cartilage tissue, but also eliminates the mechanical factors that cause joint movement obstacles caused by the torn meniscus (24). Moreover, a small amount of bleeding during the operation can form a fibrin clot, which covers the surface of the cartilage to repair it, and it can also reduce the wear and tear of the cartilage surface in the short term (25). During the cleaning process, a large amount of continuous perfusion with a certain pressure of normal saline can clean the joint cavity, which can remove the degenerated cartilage debris and a large amount of inflammatory mediators

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in the joint cavity and flow out with the water, thereby quickly eliminating aseptic inflammation in the joint, improving the environment in the joints, and providing sufficient conditions for the normal secretion of synovial fluid in the joints. This ultimately relieves joint pain and swelling symptoms, and improves joint function (26,27). Joint debridement will cause certain trauma to the tissues in the joint. After the operation, local glucocorticoids in the joint can inhibit inflammation, ameliorate synovial congestion, and reduce vascular permeability, thereby reducing joint effusion (28,29). Joint debridement surgery with simultaneous supplementation of sodium hyaluronate can protect the tissue structure in the joint cavity, induce synovial cells to secrete endogenous sodium hyaluronate, and bind glycoproteins, thereby reducing the need for further verification and increasing the therapeutic effect (30). However, compared with drug treatment, which can only alleviate the joint pain partly, arthroscopic treatment can reduce the pain more quickly and deeply.

The results of this study clearly show that the United States is leading the research into the role of arthroscopy in joint diseases, with the Hospital of Special Surgery, the American Hip Institute, the Steadman Philippon Research Institute, Washington University, and the Mayo Clinic being the flagship institutions. In the field of orthopedics, especially joint surgery, the USA is a world leader, with the abovementioned institutions being the central nodes of cooperation in this field. If researchers wish to exchange experiences or seek cooperation with experienced institutions, they can consider these institutions. However, the analysis of the authors shows that the degree of cooperation between researchers is not high (the centrality scores did not reach 0.01). Although the degree of cooperation between institutions is relatively high, there are many researchers in each institution, and different topics are completed by different researchers who may belong to the same research institution; thus, the centrality score of the institution may be high but that of the researchers may be low.

Our study also found that important research institutions have a large number of research results in the field of arthroscopy diagnosis and treatment, which deserves close attention. When doing literature search, we can take those top institutions and authors in our results as search targets. Since arthroscopy is relatively professional, the research results in this field are all published in orthopedics or joint professional journals. For high quality of literature investigating, we can pay more attention on the top journals in our analysis results, including *Arthroscopy*, *American Journal of Sports Medicine*, *Knee Surgery*, *Sports Traumatology*, *Arthroscopy*, *Osteoarthritis and Cartilage*, and *Clinical Orthopaedics and Related Research*. Keyword analysis results show that knee joints and hip joints are the focus of arthroscopic research and that there are relatively few studies on other joints. This may be due to the limitation of arthroscopic technology, the high complexity of other joints, and the low incidence of OA in other joints; research into other joints can be appropriately increased in the future.

Using the SCI-E citation database, this study analyzed the current status of research on arthroscopy in the field of OA, summarized the main research sources in this field, revealed some issues that researchers should pay attention to, and used keyword analysis to track the changes in research interest in this field. These finding may be valuable for researchers in this field in determining research directions, carrying out cooperative projects, and exchanging experiences.

Some limitations to this study should also be noted. First, an in-depth analysis of the relative strengths and specialties that different research institutions and researchers in this field possess was not undertaken in this study. Second, we were not able to extensively examine the current issues in this field that have yet to be resolved. This may require additional systematic reviews or meta-analyses.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://dx.doi.org/10.21037/apm-21-3548). YL, JC, LK, and HZ report that they received funding support from Jinzhou Medical University School-Enterprise Cooperation Fund Project (No. 2020002). The other authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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