Original Article

The recent 10-year landscape of aortic dissection research: a bibliometric analysis

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Background: We aimed to comprehensively analyze all the literature related to aortic dissection (AD) in the past decade using Web Scrapping technology from PubMed, revealing the research dynamics in this field.

Methods: Data were retrieved and downloaded from PubMed with search strategy as "(aortic dissection [Title/Abstract]) AND (2010[EDAT]: 2020[EDAT])". Information on the PMID, journal name, title, number of citations, publication year, authors, affiliations, abstract, study type, and keywords of the research was recorded.

Results: A total of 7,470 publications were identified. Most of the articles were published in *J Thorac Cardiovasc Surg*; Japan was the country with the largest publications number; the USA was far ahead of other countries regarding the highly cited studies; Yale University and Baylor College of Medicine took the first place for publishing most of the highly cited articles; the most frequently cited article is the 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases; most of the clinical trials were published on *J Vasc Surg*; John A. Elefteriades ranked first by cumulative publication numbers; Christoph A. Nienaber took the lead by both cumulative citations and impact factors; Dianna M. Milewicz was the only female researcher on all the three ranking lists; the most common keywords in aortic dissection were Treatment Outcome and Retrospective Studies.

Conclusions: This study provides interesting insights into the AD scientific landscape in recent 10 years and generates some objective evidence for comprehensive understanding and evaluation of this field. This investigation may ultimately inform managers, researchers and policymakers.

Keywords: Aortic dissection; bibliometric; PubMed

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Introduction

Aortic dissection (AD), the well-known "ticking time bomb" in medicine, was estimated to be 4.4 per 100,000 person-year (1). In view of its urgency and high risk, researchers have always had a strong interest in this disorder, rendering it one of the hotspots in cardiovascular researches. A large number of literature about AD are published every year. It is

no exaggeration to say that we are in an era of information explosion, which is of both opportunity and challenge. It's very hard for any researcher in this filed to grasp the "full image" of AD research. Therefore, it is important to sort out and summarize the literature systematically, so that readers can obtain information more efficiently and in a broader view. Traditionally, Review has been the main approach of literature mining and curation, which requires a lot of manual reading and extraction, so it can only be used to summarize and evaluate specific parts of a specialty. To establish a more comprehensive summarization and evaluation, a more efficient and advanced way is necessitated-bibliometrics.

Bibliometrics refers to an interdisciplinary science of quantitative analysis of literature using mathematics and statistics. At present, there are few bibliometric reports in the field of AD. We aimed to comprehensively analyze all the literature related to AD on PubMed in the past decade using Web Scrapping technology, from different aspects of researchers, journals, institutions, and countries, etc., revealing the research dynamics in this field, and to a certain extent, helping other researchers foresee the research trends.

Methods

The study was approved by the Chinese Ethics Committee of Registering Clinical Trials (ChiECRCT-20180041), with informed consent waived. Statistical analysis and data visualization were performed using the R 3.6.1 (R Foundation for Statistical Computing, Vienna, Austria).

Data were retrieved and downloaded using RISmed and pubmed.mineR packages from PubMed, a website (http://www.ncbi.nlm.nih.gov/pubmed/) that provides free access to biomedical journal citations and abstracts. A total of 7,470 publications were identified using the following PubMed search strategy: "(aortic dissection [Title/Abstract]) AND (2010 [EDAT]: 2020 [EDAT])". Of note, the closing date for the current study was July 31st, 2020. There were no other restrictions such as study types, abstract availability, language, etc. Information on the PMID, journal name (both full name and abbreviated), title, number of citations, publication year, authors, affiliations, abstract, study type, and keywords of the research was recorded. The full text was downloaded if necessary.

Statistical analysis

The following R packages were used for cleaning, analysis, and plotting: rio, stringr, plyr, ggplot2, circlize, ggmap, maps, and ggrepel. Descriptive analyses were conducted to calculate the frequencies of published articles on the level of journals, authors, countries, etc. Association between the journal IF and the number of citations was assessed using the Pearson Correlation test and a two-sided P value of less than 0.05 was considered significant. Further, Word cloud diagrams were generated to visualize the keywords frequencies. The authors' cooperation network was represented by a chord graph. In addition, we used maps to present geographic information (such as countries and research centers). The top 100 highly cited articles in the past decade were independently screened and evaluated by two researchers (Rui Zhao and Donglin Zhuang). Any discrepancies between the two authors would be discussed in a core meeting to reach an agreement.

Results

As shown in *Figure 1*, most of the literature about AD were published in *J Thorac Cardiovasc Surg* (389, 5.2%), followed by *Ann Thorac Surg* (373, 4.9%), *Eur J Cardiothorac Surg* (308, 4.1%), *J Vasc Surg* (231, 3.1%), and *Interact Cardiovasc Thorac Surg* (210, 2.8%). *Figure 2A* shows the year-on-year changes in the number of publications of the three major cardiothoracic surgery journals (*J Thorac Cardiovasc Surg*, *Ann Thorac Surg*, and *Eur J Cardiothorac Surg*). The publication volume of the three journals was comparable before 2018. After that, the number of AD papers published in *J Thorac Cardiovasc Surg* increased significantly. To be noted, the publication data of 2020 was not complete, as the deadline for data retrieval was July 26, 2020. According to the dependent territory of the journal, most articles were published in United States (2,676, 35.8%), followed by United Kingdom (1,241, 16.6%), Netherlands (803, 10.7%), Japan (620, 8.3%), Germany (562, 7.5%), and China (438, 5.9%). We further analyzed the sources of articles in three major cardiothoracic surgery journals and a Chinese Journal (*J Thorac Dis*) as a comparison. Out of the 1,164 articles published in the aforementioned four journals, information on first affiliations was successfully extracted in 796 (68.4%). The top five source countries of *J Thorac Cardiovasc Surg* (n=244), belonging to USA, were Japan (52, 21.3%), China (35, 14.3%), Germany (33, 13.5%), Italy (18, 7.4%), and USA (18, 7.4%), respectively; The top five source countries of *Ann Thorac Surg* (n=248), belonging to USA, were Japan (55, 22.2%), Germany (31, 12.5%), China (31, 12.5%), USA (23, 9.3%), and Italy (19, 7.7%), respectively; The top

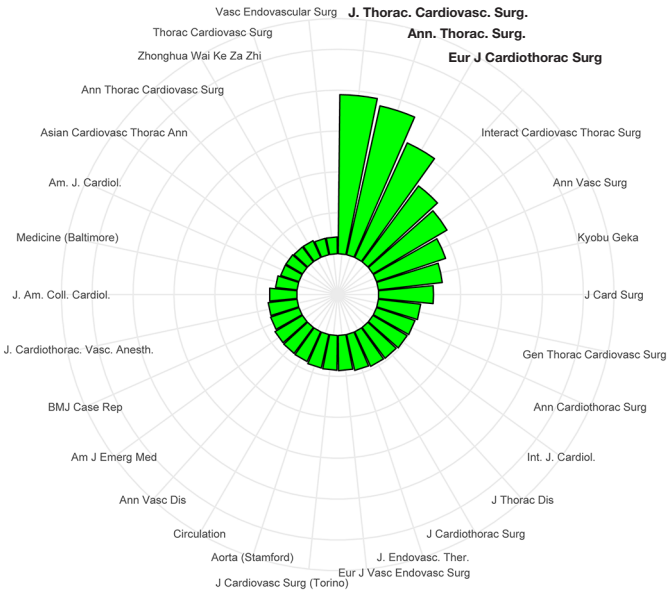

Figure 1 Rose plot displaying the journal ranking by publication numbers of aortic dissection.

five source countries of *Eur J Cardiothorac Surg* (n=215), belonging to Germany, were Germany (59, 27.4%), Japan (44, 20.5%), USA (23, 10.7%), China (22, 10.2%), and Switzerland (12, 5.6%), respectively. The top five source countries of *J Thorac Dis* (n=89), belonging to China, were China (53, 60.0%), USA (8, 9.0%), Japan (5, 5.6%), South Korea (5, 5.6%), and Germany (3, 3.4%), respectively. As demonstrated above, the three major cardiothoracic surgery journals were highly internationalized, with balanced sources. No obvious regional publication discrimination or tendency was found. As a relatively "young" journal, *J Thorac Dis* still needs time to grow.

In terms of publication types of those 7,470 articles, Journal Article accounted for the majority (4,181, 55.9%), followed by Case Reports (2,250, 30.1%), Comparative Study (365, 4.8%), Editorial (197, 2.6%), Letter (187, 2.5%), etc. We further analyzed the article types of the three major cardiothoracic surgery journals (*Figure 2B*). As expected, Journal Article was the most common type, especially for *Eur J Cardiothorac Surg*. *J Thorac Cardiovasc Surg* published more Editorials while *Ann Thorac Surg* published more Case Reports compared to others. This information may be helpful to guide researchers to choose the appropriate journal according to the article type. It is worth noting that from the 7,470 articles, only 10 clinical trials (0.5%) were found based on the article type marked by PubMed. The basic information of these 10 clinical trials was shown in *Table 1*. Most of the clinical trials were published on *J Vasc Surg* (4, 40%), followed by *Ann Thorac Surg* (2, 20%). The USA contributed 5 (50%) clinical trials, followed by the United Kingdom (2, 20%), Canada (2, 20%) and Germany (1, 10%). Most clinical trials focused on endovascular treatment of type B dissection (6, 60%), and hybrid operation for type A dissection (2,20%). The total number of citations of these 10 clinical trials was 88, and the endovascular treatment of type B dissection accounted for up to 78 (88.6%) citations.

To demonstrate the most influential and active researchers in this field, we first counted the publication numbers by individual researchers (first and senior author) in the past decade (*Figure 3A*). John A. Elefteriades ranked first, followed by Christoph A. Nienaber and Lizhong Sun. Of note, two female researchers also entered the top 30 list regarding publication numbers: Ourania Preventza and Dianna M. Milewicz. Specifically, the top 10 female researchers by publication numbers were Ourania Preventza, Dianna M. Milewicz, Jolien W Rooshesselink, Rossella Fattori, Rachel E. Clough, Elizabeth L. Norton, Akiko Tanaka, Jennifer S. Lawton, Julie De Backer, and Sherene Shalhub. Next, we ranked the researchers according to the cumulative number of citations (*Figure 3B*), with Raimund Erbel being the first, Ivan Kravchenko the second, and Christoph A. Nienaber the third. The most frequently cited article in the AD field is the 2014

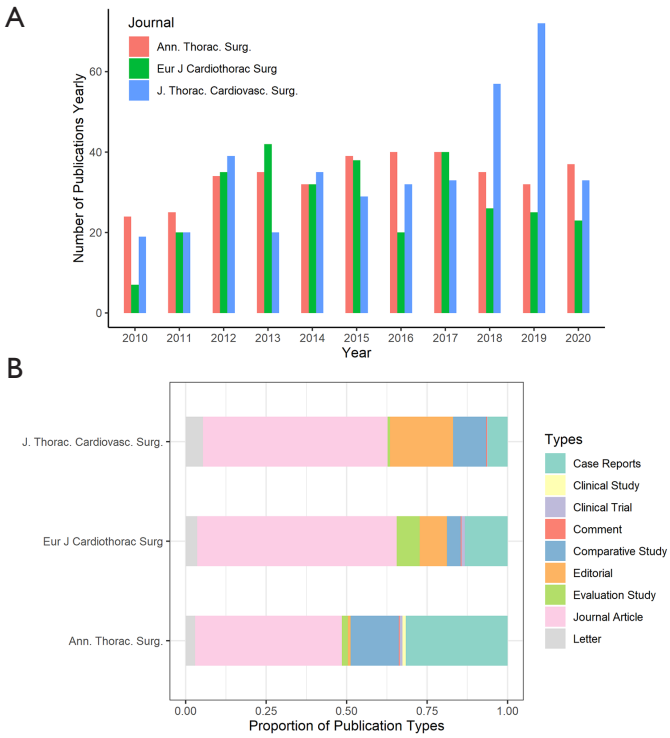

Figure 2 Publication data of the three major cardiovascular surgery journals. (A) Year-on-year changes in the number of publications of the three major cardiothoracic surgery journals (*J Thorac Cardiovasc Surg*, *Ann Thorac Surg*, and *Eur J Cardiothorac Surg*). (B) The proportion of publication types of the three major cardiothoracic surgery journals (*J Thorac Cardiovasc Surg*, *Ann Thorac Surg*, and *Eur J Cardiothorac Surg*).

ESC Guidelines on the diagnosis and treatment of aortic diseases, a product of the collective effort by a group of extraordinary aortic experts (2). So, we made another ranking by excluding this Guideline to eliminate the potential biased effect on the individual ranking of citations. In the updated ranking, Christoph A. Nienaber stood in the first place, followed by Dianna M. Milewicz and John A. Elefteriades. Although not 100% perfect, the impact factor is still an important measure of the journal level and the difficulty of publication, so we also ranked the researchers according to their cumulative impact factors (*Figure 3C*). Christoph A. Nienaber took the first place, followed by Kim A. Eagle, and John A. Elefteriades. A total of 13 researchers were on all the three lists (top 30) by publication numbers, cumulative citations, and cumulative impact factors: John A. Elefteriades, Christoph A. Nienaber, Lizhong Sun, Yutaka Okita, Zaiping Jing, Joseph S. Coselli, Bartosz Rylski, Martin Czerny, Santi Trimarchi, Kim A. Eagle, Scott A. Lemaire, Dianna M. Milewicz, and G. Chad Hughes. Of note, John A. Elefteriades and Christoph A. Nienaber were the only two researchers entering all the three lists (top 3) by either publication numbers, cumulative citations, or cumulative impact factors. What's more, we also made a chord graph to show the authors' collaboration network (*Figure 3D*). If the number of collaborative articles between the two authors was greater than 15, they would appear on this network. The more cooperations between two authors, the thicker the connection.

We extracted the first affiliations from the 7,470 articles and mapped them geographically (*Figure 4A*). The darker the color, the greater the number of publications. Japan stands in the first place regarding publication volume, followed by China, USA, Germany, and Italy. Since the number of citations can comprehensively reflect the influence and spread of an article, we listed the top 10 articles with the highest citation rates in the past decade (*Table 2*) and provided the top 100 articles with the highest citation rates in the Table S1. We further marked the institutions where the top 100 most cited articles were from on the map according to the city coordinates (*Figure 4B*).

Table 1 Clinical trials in recent 10 years regarding aortic dissection

PMID	Titles	Journal	Year	Impact factor	First author	First affiliation
20807993	External aortic root support for Marfan syndrome: early clinical results in the first 20 recipients with a bespoke implant	*J R Soc Med*	2010	5.238	John Pepper	Royal Brompton Hospital
22169668	Prospective multicenter clinical trial (STABLE) on the endovascular treatment of complicated type B aortic dissection using a composite device design	*J Vasc Surg*	2011	3.405	Joseph V. Lombardi	Cooper University Hospital
23800455	Fenestrated and branched endovascular aortic repair for chronic type B aortic dissection with thoracoabdominal aneurysms	*J Vasc Surg*	2013	3.405	Atsushi Kitagawa	Cleveland Clinic Foundation
24560244	Aortic remodeling after endovascular treatment of complicated type B aortic dissection with the use of a composite device design	*J Vasc Surg*	2014	3.405	Joseph V. Lombardi	Cooper University Hospital
24952999	Mid-term outcomes and aortic remodelling after thoracic endovascular repair for acute, subacute, and chronic aortic dissection: the VIRTUE Registry	*Eur J Vasc Endovasc Surg*	2014	5.328	R Heijmen	St. George's Hospital
25669649	Do not leave the heart arrested. Non-cardioplegic continuous myocardial perfusion during complex aortic arch repair improves cardiac outcome	*Eur J Cardiothorac Surg*	2015	3.486	Andreas Martens	Hannover Medical School
26209487	Outcomes of Thoracic Endovascular Aortic Repair in Acute Type B Aortic Dissection: Results From the Valiant United States Investigational Device Exemption Study	*Ann Thorac Surg*	2015	3.639	Joseph E. Bavaria	University of Pennsylvania
26211376	Multicenter clinical trial of the conformable stent graft for the treatment of acute, complicated type B dissection	*J Vasc Surg*	2015	3.405	Richard P. Cambria	Massachusetts General Hospital
30501947	Dissected Aorta Repair Through Stent Implantation trial: Canadian results	*J Thorac Cardiovasc Surg*	2018	4.451	Sabin J. Bozso	University of Alberta
31254509	Single-Stage Management of Dynamic Malperfusion Using a Novel Arch Remodeling Hybrid Graft	*Ann Thorac Surg*	2019	3.639	Sabin J. Bozso	University of Alberta

The larger the red circle, the more articles with a high citation rate were published in a specific area. It shows that almost all the highly cited papers were from the USA and Europe. The USA was far ahead of other countries regarding the highly cited studies, especially the East. Institutions with 3 or more highly cited articles included Yale University, Baylor College of Medicine, Erasmus University Medical Center, Fondazione RiMED, Mayo Clinic, University of Pennsylvania, University of Rostock, and University of Texas.

We further analyzed the correlation between impact factors and citation times, and found that there was a positive correlation between them (Pearson index: 0.31, 95% CI: 0.28–0.33, P<0.001). We listed the top 10 articles with the highest impact factor in *Table 3* and the top 100 as Table S2.

Next, we extracted the keywords and removed those words that were obviously highly frequent such as "aortic dissection", "aortic aneurysm", etc., and then calculated the frequency of the keywords. As shown in *Figure 5*, word frequency was presented in the form of a word cloud. The higher the word frequency is, the larger the area it occupies in the word cloud. During 2010 and 2014, the top 10 keywords were Treatment Outcome, Retrospective Studies, Risk Factors, Blood Vessel Prosthesis Implantation, Tomography (X-ray computed), Endovascular Procedures,

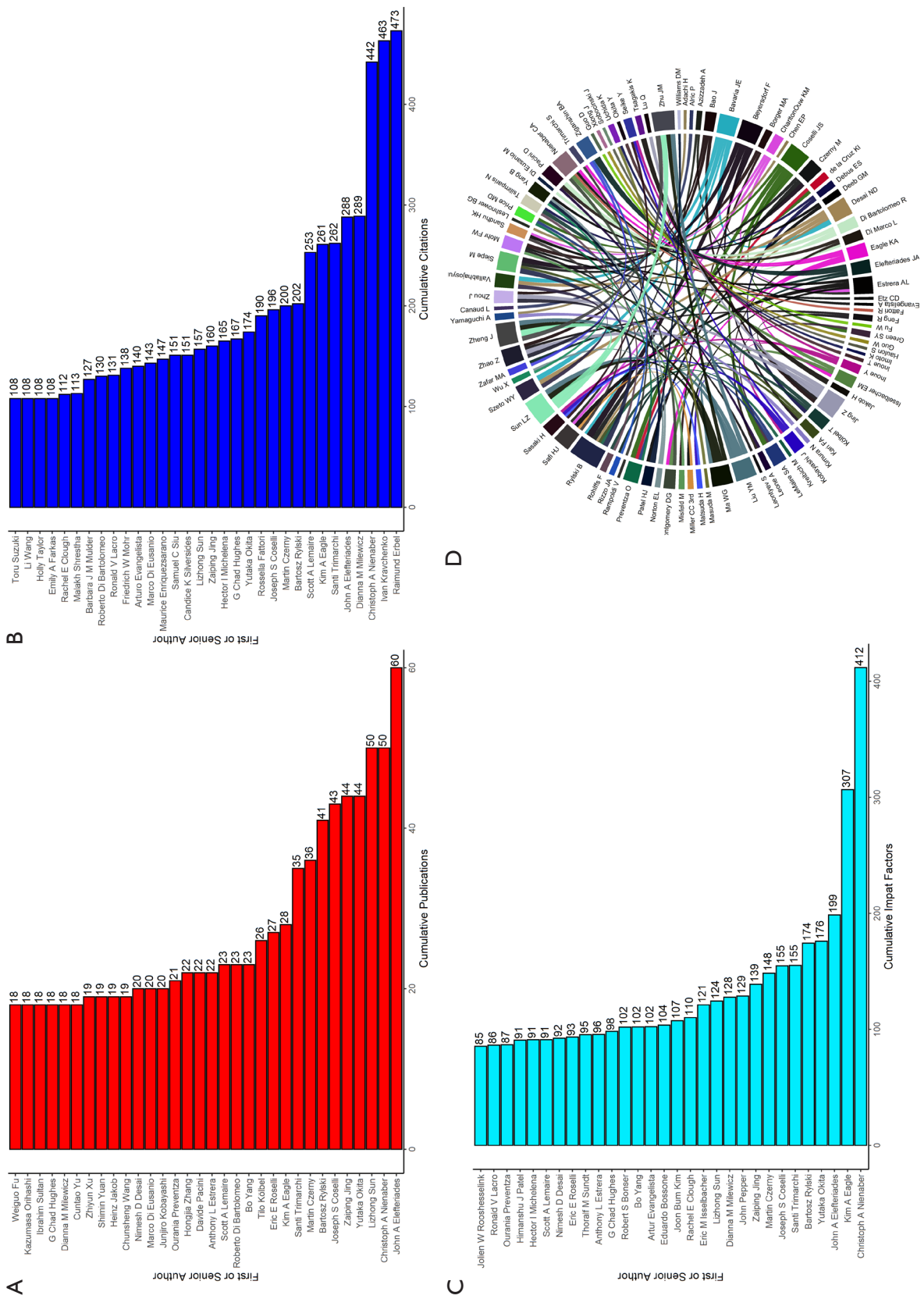

Figure 3 Top researchers of the aortic dissection research. (A) Researchers ranking by the number of publications. (B) Researchers ranking by the number of cumulative citations. (C) Researchers ranking by the number of cumulative impact factors. (D) Chord graph showing the researchers' collaboration network.

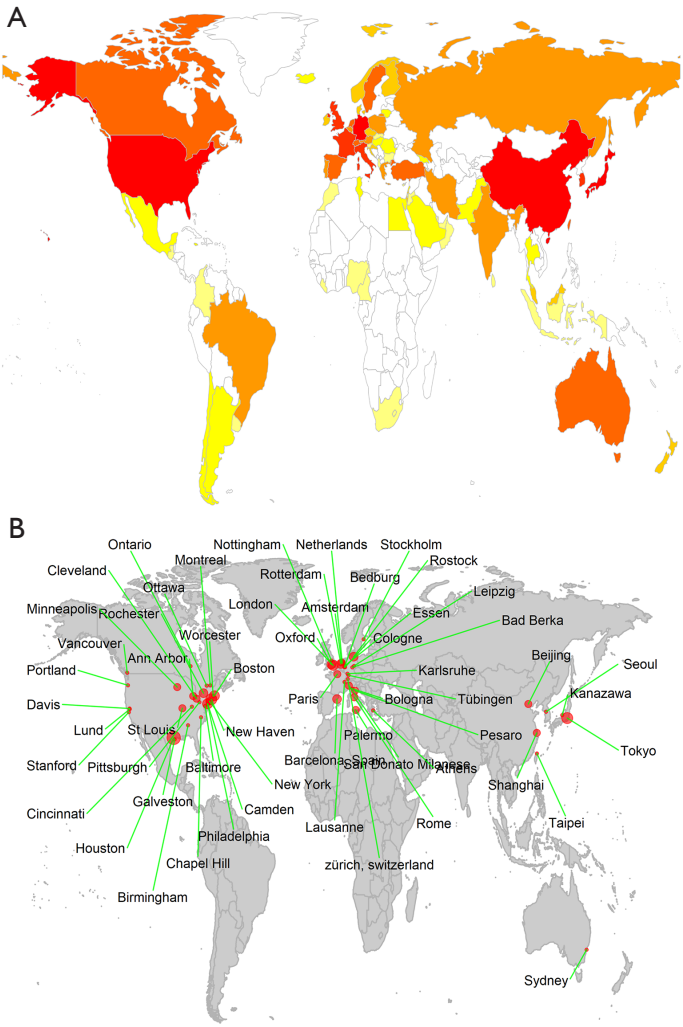

Figure 4 Geographical demonstration of the aortic dissection research. (A) World map showing the countries ranking by the number of publications. (B) World map showing the geographical distribution of the highly cited publications (top 100).

Stents, Aortography, Hospital Mortality, and Postoperative Complications. During 2015 and 2020, the top ten keywords were Retrospective Studies, Treatment Outcome, Risk Factors, Blood Vessel Prosthesis Implantation, Endovascular Procedures, Postoperative Complications, Stents, Blood Vessel Prosthesis, Computed Tomography Angiography, and Follow-Up Studies. To a certain extent, keyword frequency can reflect the research direction and hot spots in this field. We found that the research direction of AD had little change in the past decade. Most of the researches were about Treatment Outcome, Risk Factors, Blood Vessel Prosthesis Implantation, and the main research method was Retrospective Studies.

Comment

This study provides interesting insights into AD scientific landscape in recent 10 years by identifying many "firsts" or "mosts" as follows: most of the articles were published in *J Thorac Cardiovasc Surg*; Japan was the country with the largest publications number; the USA was far ahead of other countries regarding the highly cited studies; Yale University and Baylor College of Medicine took the first prize for publishing most of the highly cited articles; Journal Article was the most common article type; the most frequently cited article was the 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases (2); most of the clinical trials were published on *J Vasc Surg*; John A. Elefteriades

Table 2 Top 10 articles ranked by impact factor during 2010-2020 regarding aortic dissection

PMID	Titles	Journal	Year	Impact factor	First author	Citations
20872991	Images in clinical medicine. Aortic dissection during diagnostic aortography	*N Engl J Med*	2010	74.699	Samad Ghaffari	1
25229939	Images in clinical medicine. Aortic dissection	*N Engl J Med*	2014	74.699	Amritpal Singh Nat	0
25405392	Atenolol versus losartan in children and young adults with Marfan's syndrome	*N Engl J Med*	2014	74.699	Ronald V. Lacro	108
25662791	Management of acute aortic dissection	*Lancet*	2015	60.392	Christoph A. Nienaber	61
21917581	Incidence of aortic complications in patients with bicuspid aortic valves	*JAMA*	2011	45.54	Hector I. Michelena	122
27533160	Acute Aortic Dissection and Intramural Hematoma: A Systematic Review	*JAMA*	2016	45.54	Firas F. Mussa	34
30535217	Effect of Oral Alfacalcidol on Clinical Outcomes in Patients Without Secondary Hyperparathyroidism Receiving Maintenance Hemodialysis: The J-DAVID Randomized Clinical Trial	*JAMA*	2018	45.54	Tetsuo Shoji	10
27440162	Aortic dissection	*Nat Rev Dis Primers*	2016	40.689	Christoph A. Nienaber	19
27440218	Aortic dissection	*Nat Rev Dis Primers*	2016	40.689	–	0
27560366	Aortic dissection	*Nat Rev Dis Primers*	2016	40.689	Christoph A. Nienaber	2

ranked first by cumulative publication numbers; Christoph A. Nienaber took the lead by both cumulative citations and impact factors; Dianna M. Milewicz was the only female researcher on all the three ranking lists; The most common keywords in aortic dissection were Treatment Outcome and Retrospective Studies, etc.

According to the literature we searched, most AD researches are of a low hierarchy of evidence, with few clinical trials. As can be seen from the word cloud, most of the studies are retrospective, focusing on treatment outcome and risk factors. There are many problems to be solved in AD management, such as total arch replacement versus half arch replacement, unilateral perfusion versus bilateral perfusion, optimal circulatory arrest temperature, etc. Only high-quality data and research can provide convincing answers and promote the standardization of AD management. Admittedly, AD is a highly urgent and variable disorder, which makes it very difficult to carry out clinical trials. In recent ten years, there are only two Guidelines (2,3) for aortic disease, and both of them were put forward at least 6 years ago. Compared to other areas of cardiology or cardiac surgery, the Guideline update for the aortic disease is relatively slow, which might be partially due to the lack of high-level evidence that can influence clinical practice.

Notably, the International Registry of Acute Aortic Dissection (IRAD), the world's largest and most famous database of aortic dissection including 55 active sites in 12 countries, has set a benchmark and paradigm for the study of AD. Among the top 100 highly cited studies, IRAD contributed up to 11 articles! Prompted by IRAD, some other registered multi-center studies have also been launched such as the German Registry for Acute Aortic Dissection type A (GERAADA), Nordic Consortium for Acute Type A Aortic Dissection (NORCAAD), Gore Global Registry for Endovascular Aortic Treatment (GREAT), and International Aortic Arch Surgery Study Group (IAASG), etc. GERAADA also contributed 3 articles in the top 100 highly cited studies. These registered multi-center studies will certainly continue to greatly influence the way we treat aortic dissection worldwide. There is a large number of publications from Asia, especially China and Japan, but few highly cited works were generated. In the future, these high-volume regions may consider how to translate their large sample size to high-impact research, with IRAD as a good model.

In addition, the researches of AD mainly focus on the treatment, especially endovascular treatment. The

Table 3 Top 10 most cited articles during 2010-2020 regarding aortic dissection

PMID	Titles	Journal	Year	Impact Factor	First Author	Citations
25173340	2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult	*Eur Heart J*	2014	22.673	Raimund Erbel	463
20579534	Bicuspid aortic valve disease	*J Am Coll Cardiol*	2010	20.589	Samuel C. Siu	151
21917581	Incidence of aortic complications in patients with bicuspid aortic valves	*JAMA*	2011	45.54	Hector I. Michelena	122
23922146	Endovascular repair of type B aortic dissection: long-term results of the randomized investigation of stent grafts in aortic dissection trial	*Circ Cardiovasc Interv*	2013	5.493	Christoph A. Nienaber	110
20185035	Thoracic aortic aneurysm clinically pertinent controversies and uncertainties	*J Am Coll Cardiol*	2010	20.589	John A. Elefteriades	108
21055718	Mutations in myosin light chain kinase cause familial aortic dissections	*Am J Hum Genet*	2010	10.502	Li Wang	108
25405392	Atenolol versus losartan in children and young adults with Marfan's syndrome	*N Engl J Med*	2014	74.699	Ronald V. Lacro	108
26205591	Presentation, Diagnosis, and Outcomes of Acute Aortic Dissection: 17-Year Trends From the International Registry of Acute Aortic Dissection	*J Am Coll Cardiol*	2015	20.589	Linda A. Pape	100
23771987	Aortic dilation in bicuspid aortic valve disease: flow pattern is a major contributor and differs with valve fusion type	*Circ Cardiovasc Imaging*	2013	5.691	Malenka M. Bissell	95
23599348	Population-based study of incidence and outcome of acute aortic dissection and premorbid risk factor control: 10-year results from the Oxford Vascular Study	*Circulation*	2013	23.603	Dominic P. J. Howard	90

management of AD involves many aspects. In addition to treatment, we also need to investigate more on the epidemiology, prevention, diagnosis, and perioperative management. Among these retrieved studies, clinical research accounts for the vast majority, while basic researches are relatively rare (the top 10 frequent keywords are basically all clinical research related, and basic research only accounts for 33/105 (31.4%) of the highly cited papers). It remains unclear of the pathogenesis of aortic dissection, and no effective molecule- or pathway-targeted interventions were established. More investment in basic research is needed in the future.

Strikingly, we found that only a small proportion of aortic researchers were women. Although we cannot directly provide data on the proportion of male and female researchers in this study, out of the top 30 researchers by publication numbers, only two (2/32, 6.2%) are women (Ourania Preventza and Dianna M Milewicz). It was reported that (4) in the United States and Europe, women comprise at least 50% of medical graduates. Despite gender balance among medical trainees, only one-third of practicing physicians, and <20% of cardiology trainees are women. The gender gap is supposed to be even wider in aortic disease considering the higher work intensity. The gender gap in AD has potential adverse impacts on collegial support, mentoring, research and even patients outcomes, etc. Improving gender equality within cardiology has been identified as a powerful means to improve cardiovascular disease outcomes in women—"Small Numbers, Big Impact" (5). For example, our study shows that Dianna M. Milewicz

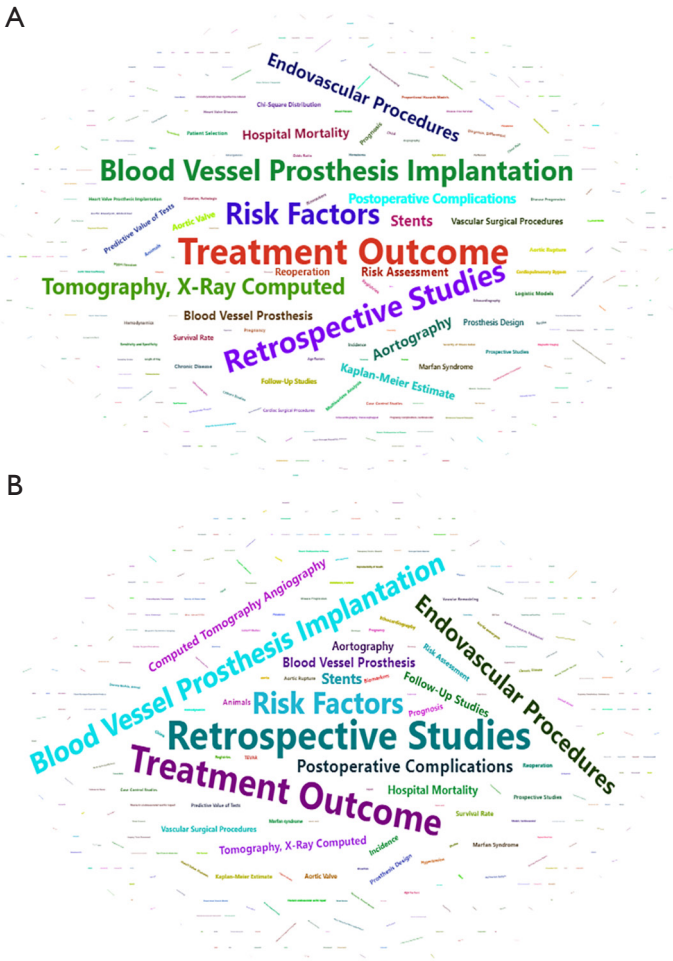

Figure 5 Word cloud of the key words. (A) Word cloud displaying the keyword frequencies between 2010–2014. (B) Word cloud displaying the keyword frequencies between 2015–2020.

as the only female in all the three ranking list (publication numbers, citations, impact factors), has been one of the mainstays in decoding the genetic predisposition to vascular diseases. As Burgess *et al*. have proposed, we must encourage a dialogue to identify barriers and provide potential solutions to empower more women to join this highly rewarding specialty (4).

Limitations

Our study should be interpreted in the context of several limitations. First, the cited rate is one of the most important tools in bibliometrics. However, it's very hard for the newly published studies to have high citations regardless of its significance because of the limited exposure. So, bibliometrics should be a dynamic analysis tool and subject to regular updates. Second, to confirm the ratio of male and female researchers, we have tried many programs and websites that were claimed to be able to automatically identify gender by name, but the accuracy was very poor. Hopefully, there will be more accurate and efficient methods to match the name and gender in the future. Third, due to the diversity of institutions naming, we had no way to accurately rank all the institutions. Instead, we sorted institutions by the list of the top 100 most cited studies manually and mapped them. The results were consistent with our knowledge of the leading institutions in this field.

Conclusions

In this study, we performed a bibliometric analysis of AD in the recent ten years and many "firsts" or "mosts" have been identified, providing some objective evidence for comprehensive understanding and evaluation of this field, which might ultimately inform managers, researchers and policymakers.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/jtd-20-3272). The 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. The study was approved by the Chinese Ethics Committee of Registering Clinical Trials (ChiECRCT-20180041), with informed consent waived.

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Table S1 Top 100 most cited articles during 2010-2020 regarding aortic dissection

PMID	Titles	Journal	Year	Impact factor	First author	Citations
25173340	2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC)	*Eur Heart J*	2014	22.673	Raimund Erbel	463
20579534	Bicuspid aortic valve disease	*J Am Coll Cardiol*	2010	20.589	Samuel C. Siu	151
21917581	Incidence of aortic complications in patients with bicuspid aortic valves	*JAMA*	2011	45.54	Hector I. Michelena	122
23922146	Endovascular repair of type B aortic dissection: long-term results of the randomized investigation of stent grafts in aortic dissection trial	*Circ Cardiovasc Interv*	2013	5.493	Christoph A. Nienaber	110
20185035	Thoracic aortic aneurysm clinically pertinent controversies and uncertainties	*J Am Coll Cardiol*	2010	20.589	John A. Elefteriades	108
21055718	Mutations in myosin light chain kinase cause familial aortic dissections	*Am J Hum Genet*	2010	10.502	Li Wang	108
25405392	Atenolol versus losartan in children and young adults with Marfan's syndrome	*N Engl J Med*	2014	74.699	Ronald V. Lacro	108
26205591	Presentation, Diagnosis, and Outcomes of Acute Aortic Dissection: 17-Year Trends From the International Registry of Acute Aortic Dissection	*J Am Coll Cardiol*	2015	20.589	Linda A. Pape	100
23771987	Aortic dilation in bicuspid aortic valve disease: flow pattern is a major contributor and differs with valve fusion type	*Circ Cardiovasc Imaging*	2013	5.691	Malenka M. Bissell	95
23599348	Population-based study of incidence and outcome of acute aortic dissection and premorbid risk factor control: 10-year results from the Oxford Vascular Study	*Circulation*	2013	23.603	Dominic P. J. Howard	90
20823280	Echocardiography in aortic diseases: EAE recommendations for clinical practice	*Eur J Echocardiogr*	2010		Arturo Evangelista	74
23500232	Interdisciplinary expert consensus document on management of type B aortic dissection	*J Am Coll Cardiol*	2013	20.589	Rossella Fattori	73
23999449	Losartan reduces aortic dilatation rate in adults with Marfan syndrome: a randomized controlled trial	*Eur Heart J*	2013	22.673	Maarten Groenink	72
22167769	Phenotypic spectrum of the SMAD3-related aneurysms-osteoarthritis syndrome	*J Med Genet*	2011	4.943	Ingrid M. B. H. Van De Laar	70
21173794	Epidemiology of thoracic aortic dissection	*Nat Rev Cardiol*	2010	20.26	Scott A. Lemaire	69
22116819	miR-29b participates in early aneurysm development in Marfan syndrome	*Circ Res*	2011	14.467	Denis R. Merk	69
25835445	Mutations in a TGF-β ligand, TGFB3, cause syndromic aortic aneurysms and dissections	*J Am Coll Cardiol*	2015	20.589	Aida M. Bertoloavella	67
25662791	Management of acute aortic dissection	*Lancet*	2015	60.392	Christoph A. Nienaber	61
23136157	Neutrophil-derived matrix metalloproteinase 9 triggers acute aortic dissection	*Circulation*	2012	23.603	Tomohiro Kurihara	56
25323262	Thoracic aortic aneurysm and dissection	*J Am Coll Cardiol*	2014	20.589	Judith Z. Goldfinger	53
23412710	Guidelines for diagnosis and treatment of aortic aneurysm and aortic dissection (JCS 2011): digest version	*Circ J*	2013	2.54	Issei Komuro	48
21810861	Management of acute aortic syndromes	*Eur Heart J*	2011	22.673	Christoph A. Nienaber	46
22285588	Giant cell arteritis: a review of classification, pathophysiology, geoepidemiology and treatment	*Autoimmun Rev*	2012	7.767	Andrea T. Borchers	46
22341418	Clinical presentation, management, and short-term outcome of patients with type A acute dissection complicated by mesenteric malperfusion: observations from the International Registry of Acute Aortic Dissection	*J Thorac Cardiovasc Surg*	2012	4.451	Marco Di Eusanio	44
23968705	Survival after endovascular therapy in patients with type B aortic dissection: a report from the International Registry of Acute Aortic Dissection (IRAD)	*JACC Cardiovasc Interv*	2013	8.432	Rossella Fattori	44
22199439	Aortic dissection: a 250-year perspective	*Tex Heart Inst J*	2011	1.023	Frank J. Criado	43
21555704	Sensitivity of the aortic dissection detection risk score, a novel guideline-based tool for identification of acute aortic dissection at initial presentation: results from the international registry of acute aortic dissection	*Circulation*	2011	23.603	Adam M. Rogers	42
23856125	Molecular mechanisms of thoracic aortic dissection	*J Surg Res*	2013	1.841	Darrell Wu	42
20228328	Multidetector CT of Aortic Dissection: A Pictorial Review	*Radiographics*	2010	4.967	Michelle A. Mcmahon	41
20375216	Approach to the patient with Turner syndrome	*J Clin Endocrinol Metab*	2010		Marsha L. Davenport	41
22633655	Aggressive cardiovascular phenotype of aneurysms-osteoarthritis syndrome caused by pathogenic SMAD3 variants	*J Am Coll Cardiol*	2012	20.589	Denise Van Der Linde	40
27432961	Loss of function mutation in LOX causes thoracic aortic aneurysm and dissection in humans	*Proc Natl Acad Sci USA*	2016	9.412	Vivian S. Lee	40
21969019	Correlates of delayed recognition and treatment of acute type A aortic dissection: the International Registry of Acute Aortic Dissection (IRAD)	*Circulation*	2011	23.603	Kevin M. Harris	39
20951252	Superior nationwide outcomes of endovascular versus open repair for isolated descending thoracic aortic aneurysm in 11,669 patients	*J Thorac Cardiovasc Surg*	2010	4.451	Raja R. Gopaldas	38
21334170	A microRNA profile-wide comparison between thoracic aortic dissection and normal thoracic aorta indicates the potential role of microRNAs in contributing to thoracic aortic dissection pathogenesis	*J Vasc Surg*	2011	3.405	Mingfang Liao	37
21868041	Effect of aneurysm on the mechanical dissection properties of the human ascending thoracic aorta	*J Thorac Cardiovasc Surg*	2011	4.451	Salvatore Pasta	37
22615344	Long-term outcome of aortic dissection with patent false lumen: predictive role of entry tear size and location	*Circulation*	2012	23.603	Artur Evangelista	37
27879251	Altered Smooth Muscle Cell Force Generation as a Driver of Thoracic Aortic Aneurysms and Dissections	*Arterioscler Thromb Vasc Biol*	2016	6.604	Dianna M. Milewicz	37
20625143	Acute aortic dissection: clinician update	*Circulation*	2010	23.603	Alan C. Braverman	36
22133845	Evidence, lack of evidence, controversy, and debate in the provision and performance of the surgery of acute type A aortic dissection	*J Am Coll Cardiol*	2011	20.589	Robert S. Bonser	36
23813850	Value of D-dimer and C reactive protein in predicting intraoph death in acute aortic dissection	*Heart*	2013	5.213	Dan Wen	36
25609416	Risk profiles for aortic dissection and ruptured or surgically treated aneurysms: a prospective cohort study	*J Am Heart Assoc*	2015	4.605	Maya Landenhed	36
20837896	Importance of refractory pain and hypertension in acute type B aortic dissection: insights from the International Registry of Acute Aortic Dissection (IRAD)	*Circulation*	2010	23.603	Santi Trimarchi	35
21747050	Cerebral protection during surgery for acute aortic dissection type A: results of the German Registry for Acute Aortic Dissection Type A (GERAADA)	*Circulation*	2011	23.603	Tobias Krüger	35
21968790	Unraveling divergent gene expression profiles in bicuspid and tricuspid aortic valve patients with thoracic aortic dilatation: the ASAP study	*Mol Med*	2011	4.096	Lasse Folkersen	35
22965999	Acute aortic intramural hematoma: an analysis from the International Registry of Acute Aortic Dissection	*Circulation*	2012	23.603	Kevin M. Harris	34
24807872	Endothelial cell-specific reactive oxygen species production increases susceptibility to aortic dissection	*Circulation*	2014	23.603	Lampson M. Fan	34
25563839	Adventitial CXCL1/G-CSF expression in response to acute aortic dissection triggers local neutrophil recruitment and activation leading to aortic rupture	*Circ Res*	2015	14.467	Atsushi Anzai	34
27533160	Acute Aortic Dissection and Intramural Hematoma: A Systematic Review	*JAMA*	2016	45.54	Firas F. Mussa	34
23685554	Interleukin-6-signal transducer and activator of transcription-3 signaling mediates aortic dissections induced by angiotensin II via the Janus kinase/signal transducer and activator of transcription-3 pathway	*Arterioscler Thromb Vasc Biol*	2013	6.604	Xiaoxi Ju	33
21236616	A comparison of endovascular revascularization with traditional therapy for the treatment of acute mesenteric ischemia	*J Vasc Surg*	2011	3.405	Zachary M. Arthurs	32
27428181	Large vessel involvement by IgG4-related disease	*Medicine (Baltimore)*	2016	1.552	Cory A. Perugino	32
20176372	Role of age in acute type A aortic dissection outcome: report from the International Registry of Acute Aortic Dissection (IRAD)	*J Thorac Cardiovasc Surg*	2010	4.451	Santi Trimarchi	31
21296332	Meta-analysis of usefulness of d-dimer to diagnose acute aortic dissection	*Am J Cardiol*	2011	2.57	Avi Shimony	31
23018968	Possible mechanical roles of glycosaminoglycans in thoracic aortic dissection and associations with dysregulated transforming growth factor-β	*J Vasc Res*	2012	1.725	J. D. Humphrey	31
23985903	Oxidative stress modulates vascular smooth muscle cell phenotype via CTGF in thoracic aortic aneurysm	*Cardiovasc Res*	2013	8.168	Emanuela Branchetti	30
21092775	Thoracic endovascular aortic repair for acute complicated type B aortic dissection: superiority relative to conventional open surgical and medical therapy	*J Thorac Cardiovasc Surg*	2010	4.451	Ahmad Zeeshan	29
22480393	What is the best strategy for brain protection in patients undergoing aortic arch surgery? A single center experience of 636 patients	*Ann Thorac Surg*	2012	3.639	Martin Misfeld	29
23032325	Moderate aortic enlargement and bicuspid aortic valve are associated with aortic dissection in Turner syndrome: report of the international turner syndrome aortic dissection registry	*Circulation*	2012	23.603	Misty Carlson	29
25759435	Aortic Disease Presentation and Outcome Associated With ACTA2 Mutations	*Circ Cardiovasc Genet*	2015	4.534	Ellen S Regalado	29
25923510	Granulocyte macrophage colony-stimulating factor is required for aortic dissection/intramural hematoma	*Nat Commun*	2015	12.121	Bokyung Son	29
20860543	Inflammation and immune response in acute aortic dissection	*Ann Med*	2010	3.243	Flavia Del Porto	28
21880515	A systematic review of mid-term outcomes of thoracic endovascular repair (TEVAR) of chronic type B aortic dissection	*Eur J Vasc Endovasc Surg*	2011	5.328	S. G. Thrumurthy	28
21944678	Type-selective benefits of medications in treatment of acute aortic dissection (from the International Registry of Acute Aortic Dissection (IRAD))	*Am J Cardiol*	2011	2.57	Toru Suzuki	28
22169668	Prospective multicenter clinical trial (STABILE) on the endovascular treatment of complicated type B aortic dissection using a composite device design	*J Vasc Surg*	2011	3.405	Joseph V. Lombardi	28
23908246	Natural regulatory T cells limit angiotensin II-induced aneurysm formation and rupture in mice	*Arterioscler Thromb Vasc Biol*	2013	6.604	Hafid Ait-oufella	28
21463791	Open repair of thoracoabdominal aortic aneurysm in the modern surgical era: contemporary outcomes in 509 patients	*J Am Coll Surg*	2011	4.59	Daniel R. Wong	27
22386146	A new imaging method for assessment of aortic dissection using four-dimensional phase contrast magnetic resonance imaging	*J Vasc Surg*	2012	3.405	Rachel E. Clough	27
22831780	A novel distinctive cerebrovascular phenotype is associated with heterozygous Arg179 ACTA2 mutations	*Brain*	2012	11.337	Pinki Munot	27
23724401	Winter cardiovascular diseases phenomenon	*N Am J Med Sci*	2013		Auda Fares	27
24509277	How does the ascending aorta geometry change when it dissects?	*J Am Coll Cardiol*	2014	20.589	Bartosz Rylski	27
26436523	Risk of Aortic Dissection and Aortic Aneurysm in Patients Taking Oral Fluoroquinolone	*JAMA Intern Med*	2015	18.652	Chienchang Lee	27
21256291	Pathogenesis of acute aortic dissection: a finite element stress analysis	*Ann Thorac Surg*	2011	3.639	Derek P. Nathan	26
22701807	Genetic insights into bicuspid aortic valve formation	*Cardiol Res Pract*	2012	1.292	Brigitte Laforest	26
23885677	The IRAD classification system for characterizing survival after aortic dissection	*Am J Med*	2013	4.529	Anna M. Booher	26
26988590	Pharmacologically Improved Contractility Protects Against Aortic Dissection in Mice With Disrupted Transforming Growth Factor-β Signaling Despite Compromised Extracellular Matrix Properties	*Arterioscler Thromb Vasc Biol*	2016	6.604	Jacopo Ferruzzi	26
21315615	Total arch repair versus hemiarch repair in the management of acute DeBakey type I aortic dissection	*Eur J Cardiothorac Surg*	2011	3.486	Joon Bum Kim	25
21713101	The Murine Angiotensin II-Induced Abdominal Aortic Aneurysm Model: Rupture Risk and Inflammatory Progression Patterns	*Front Pharmacol*	2010	4.225	Richard Y. Cao	25
22466700	Risk of late aortic events after an isolated aortic valve replacement for bicuspid aortic valve stenosis with concomitant ascending aortic dilation	*Eur J Cardiothorac Surg*	2012	3.486	Evaldas Girdauskas	25
22912384	Hyperhomocysteinemia exaggerates adventitial inflammation and angiotensin II-induced abdominal aortic aneurysm in mice	*Circ Res*	2012	14.467	Ziyi Liu	25
23494585	Biomechanical roles of medial pooling of glycosaminoglycans in thoracic aortic dissection	*Biomech Model Mechanobiol*	2013	2.527	Sara Roccabianca	25
23664314	Difference in hemodynamic and wall stress of ascending thoracic aortic aneurysms with bicuspid and tricuspid aortic valve	*J Biomech*	2013	2.32	Salvatore Pasta	25
24021768	Differential tensile strength and collagen composition in ascending aortic aneurysms by aortic valve phenotype	*Ann Thorac Surg*	2013	3.639	Joseph E Pichamuthu	25
24962744	Endovascular repair of acute uncomplicated aortic type B dissection promotes aortic remodeling: 1 year results of the ADSORB trial	*Eur J Vasc Endovasc Surg*	2014	5.328	J. Brunkwall	25
26310986	Bicuspid aortic valve aortopathy in adults: Incidence, etiology, and clinical significance	*Int J Cardiol*	2015	3.229	Hector I. Michelena	25
26510701	Mortality in patients with acute aortic dissection type A: analysis of pre- and intraoperative risk factors from the German Registry for Acute Aortic Dissection Type A (GERAADA)	*Eur J Cardiothorac Surg*	2015	3.486	Lars Oliver Conzelmann	25
26891740	Ascending Aortic Aneurysm in Angiotensin II-Infused Mice: Formation, Progression, and the Role of Focal Dissections	*Arterioscler Thromb Vasc Biol*	2016	6.604	Bram Trachet	25
26898979	Outcomes of 3309 thoracoabdominal aortic aneurysm repairs	*J Thorac Cardiovasc Surg*	2016	4.451	Joseph S. Coselli	25
27297344	Hereditary Influence in Thoracic Aortic Aneurysm and Dissection	*Circulation*	2016	23.603	Eric M Isselbacher	25
27879313	International Registry of Patients Carrying TGFBR1 or TGFBR2 Mutations: Results of the MAC (Montalcino Aortic Consortium)	*Circ Cardiovasc Genet*	2016	4.534	Guillaume Jondeau	25
20610592	Open and endovascular repair of type B aortic dissection in the Nationwide Inpatient Sample	*J Vasc Surg*	2010	3.405	Teviah Sachs	24
20678882	A clinicopathologic study of immunoglobulin G4-related sclerosing disease of the thoracic aorta	*J Vasc Surg*	2010	3.405	Satomi Kasashima	24
21094365	Long-term risk of aortic events following aortic valve replacement in patients with bicuspid aortic valves	*Am J Cardiol*	2010	2.57	Stephen H Bickellar	24
23977510	Results of open thoracoabdominal aortic aneurysm repair	*Ann Cardiothorac Surg*	2013	3.058	Scott A Lemaire	24
24109565	A systematic review and meta-analysis on the safety and efficacy of the frozen elephant trunk technique in aortic arch surgery	*Ann Cardiothorac Surg*	2013	3.058	David H. Tian	24
24952999	Mid-term outcomes and aortic remodelling after thoracic endovascular repair for acute, subacute, and chronic aortic dissection: the VIRTUE Registry	*Eur J Vasc Endovasc Surg*	2014	5.328	R. Heijmen	24
26088302	The Impact of Pre-Operative Malperfusion on Outcome in Acute Type A Aortic Dissection: Results From the GERAADA Registry	*J Am Coll Cardiol*	2015	20.589	Martin Czerny	24
29515038	Massive aggrecan and versican accumulation in thoracic aortic aneurysm and dissection	*JCI Insight*	2018	6.205	Frank S. Cikach	24
21257900	Cardiovascular anomalies in Turner syndrome: spectrum, prevalence, and cardiac MRI findings in a pediatric and young adult population	*AJR Am J Roentgenol*	2011		Hee Kyung Kim	23
21343485	Impact of Adaptive Statistical Iterative Reconstruction (ASIR) on radiation dose and image quality in aortic dissection studies: a qualitative and quantitative analysis	*AJR Am J Roentgenol*	2011		Daniel Cornfeld	23
22789301	Systematic review of clinical outcomes in hybrid procedures for aortic arch dissections and other arch diseases	*J Thorac Cardiovasc Surg*	2012	4.451	Piergiorgio Cao	23
22960022	Association of smooth muscle cell phenotypes with extracellular matrix disorders in thoracic aortic dissection	*J Vasc Surg*	2012	3.405	Lixin Wang	23
23582687	Circulating transforming growth factor-β is a prognostic biomarker in Marfan syndrome	*Int J Cardiol*	2013	3.229	Romy Franken	23
24967162	Management of complicated and uncomplicated acute type B dissection. A systematic review and meta-analysis	*Ann Cardiothorac Surg*	2014	3.058	Konstantinos G Moulakakis	23
29685932	Insights From the International Registry of Acute Aortic Dissection: A 20-Year Experience of Collaborative Clinical Research	*Circulation*	2018	23.603	Arturo Evangelista	23

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Table S2 Top 100 impact factor articles during 2010-2020 regarding aortic dissection

PMID	Titles	Journal	Year	Impact factor	First author	Citations
20872991	Images in clinical medicine. Aortic dissection during diagnostic aortography	*N Engl J Med*	2010	74.699	Samad Ghaffari	1
25229939	Images in clinical medicine. Aortic dissection	*N Engl J Med*	2014	74.699	Amritpal Singh Nat	0
25405392	Atenolol versus losartan in children and young adults with Marfan's syndrome	*N Engl J Med*	2014	74.699	Ronald V. Lacro	108
25662791	Management of acute aortic dissection	*Lancet*	2015	60.392	Christoph A. Nienaber	61
21917581	Incidence of aortic complications in patients with bicuspid aortic valves	*JAMA*	2011	45.54	Hector I Michelena	122
27533160	Acute Aortic Dissection and Intramural Hematoma: A Systematic Review	*JAMA*	2016	45.54	Firas F. Mussa	34
30535217	Effect of Oral Allacalcidol on Clinical Outcomes in Patients Without Secondary Hyperparathyroidism Receiving Maintenance Hemodialysis: The J-DAVID Randomized Clinical Trial	*JAMA*	2018	45.54	Tetsuo Shoji	10
27440162	Aortic dissection	*Nat Rev Dis Primers*	2016	40.689	Christoph A. Nienaber	19
27440218	Aortic dissection	*Nat Rev Dis Primers*	2016	40.689	–	0
27560366	Aortic dissection	*Nat Rev Dis Primers*	2016	40.689	Christoph A. Nienaber	2
21422406	Phase II trial of cisplatin, gemcitabine, and bevacizumab as first-line therapy for metastatic urothelial carcinoma: Hoosier Oncology Group GU 04-75	*J Clin Oncol*	2011	32.956	Noah M. Hahn	54
21838810	Acute aortic dissection	*BMJ*	2011	30.223	Aaron M. Ranasinghe	4
22236596	The diagnosis and management of aortic dissection	*BMJ*	2012	30.223	Sri G. Thrumurthy	16
25205491	Does intensive medical treatment improve outcomes in aortic dissection?	*BMJ*	2014	30.223	Frank A. Lederle	2
29519981	Fluoroquinolone use and risk of aortic aneurysm and dissection: nationwide cohort study	*BMJ*	2018	30.223	Björn Pasternak	22
31974270	Half of patients with acute aortic dissection in England die before reaching a specialist centre	*BMJ*	2020	30.223	Elisabeth Mahase	0
20124134	Letter by Hugl regarding article, "Diagnosis of acute aortic dissection by D-dimer: the International Registry of Acute Aortic Dissection Substudy on Biomarkers (IRAD-Bio) experience"	*Circulation*	2010	23.603	Olivier W. Hugli	3
20837683	Letter by Canaud et al. regarding article, "Retrograde ascending aortic dissection during or after thoracic aortic stent graft placement: insight from the European registry on endovascular aortic repair complications"	*Circulation*	2010	23.603	Ludovic Canaud	0
20625143	Acute aortic dissection: clinician update	*Circulation*	2010	23.603	Alan C. Braverman	36
20837896	Importance of refractory pain and hypertension in acute type B aortic dissection: insights from the International Registry of Acute Aortic Dissection (IRAD)	*Circulation*	2010	23.603	Santi Trimarchi	35
20837929	Impact of new development of ulcer-like projection on clinical outcomes in patients with type B aortic dissection with closed and thrombosed false lumen	*Circulation*	2010	23.603	Takeshi Kitai	17
20855660	Extensive primary repair of the thoracic aorta in acute type a aortic dissection by means of ascending aorta replacement combined with open placement of triple-branched stent graft: early results	*Circulation*	2010	23.603	Liangwan Chen	12
21555704	Sensitivity of the aortic dissection detection risk score, a novel guideline-based tool for identification of acute aortic dissection at initial presentation: results from the international registry of acute aortic dissection	*Circulation*	2011	23.603	Adam M. Rogers	42
21555718	Large aortic pseudoaneurysm, from left coronary ostium, with aortopulmonary fistula 19 years after aortic root replacement for type a aortic dissection	*Circulation*	2011	23.603	Robert Ibe	0
21576657	Total arch repair for acute type A aortic dissection with 2 modified techniques: open single-branched stent graft placement and reinforcement of the dissected arch vessel stump with stent graft	*Circulation*	2011	23.603	Liangwan Chen	7
21576676	Images in cardiovascular medicine: left atrial compression secondary to contained rupture of type a aortic dissection	*Circulation*	2011	23.603	Robert S. Bonser	1
21646502	Letter by Muzi and Glauber regarding article, "Extensive primary repair of the thoracic aorta in acute type A aortic dissection by means of ascending aorta replacement combined with open placement of triple-branched stent graft: early results"	*Circulation*	2011	23.603	Michele Murzi	0
21690497	Letter by Benedetto et al. regarding article, "Importance of refractory pain and hypertension in acute type B aortic dissection: insights from the International Registry of Acute Aortic Dissection (IRAD)"	*Circulation*	2011	23.603	Umberto Benedetto	0
21747050	Cerebral protection during surgery for acute aortic dissection type A: results of the German Registry for Acute Aortic Dissection Type A (GERAADA)	*Circulation*	2011	23.603	Tobias Krüger	35
21875908	Mortality and neurologic injury after surgical repair with hypothermic circulatory arrest in acute and chronic proximal thoracic aortic pathology: effect of age on outcome	*Circulation*	2011	23.603	Martin Czerny	7
21911807	Neurological outcomes after immediate aortic repair for acute type A aortic dissection complicated by coma	*Circulation*	2011	23.603	Takuro Tsukube	14
21969019	Correlates of delayed recognition and treatment of acute type A aortic dissection: the International Registry of Acute Aortic Dissection (IRAD)	*Circulation*	2011	23.603	Kevin M. Harris	39
22133496	Aortic event rate in the Marfan population: a cohort study	*Circulation*	2011	23.603	Guillaume Jondeau	18
22392866	Iatrogenic aortic dissection ... or intramural hematoma?	*Circulation*	2012	23.603	Terrence D. Welch	6
22431886	Dry gangrene after aortic dissection	*Circulation*	2012	23.603	Juhung Ko	0
22615344	Long-term outcome of aortic dissection with patent false lumen: predictive role of entry tear size and location	*Circulation*	2012	23.603	Artur Evangelista	37
22965969	Medial regeneration using a biodegradable felt as a scaffold preserves integrity and compliance of a canine dissected aorta	*Circulation*	2012	23.603	Mitsuru Sato	0
22965999	Acute aortic intramural hematoma: an analysis from the International Registry of Acute Aortic Dissection	*Circulation*	2012	23.603	Kevin M. Harris	34
22966000	Impact of controlled pericardial drainage on critical cardiac tamponade with acute type A aortic dissection	*Circulation*	2012	23.603	Taro Hayashi	8
23023235	Moderate aortic enlargement and bicuspid aortic valve are associated with aortic dissection in Turner syndrome: report of the international turner syndrome aortic dissection registry	*Circulation*	2012	23.603	Misty Carlson	29
23136157	Neutrophil-derived matrix metalloproteinase 9 triggers acute aortic dissection	*Circulation*	2012	23.603	Tomohiro Kurihara	56
23283856	Aortic pathology determines midterm outcome after endovascular repair of the thoracic aorta: report from the Medtronic Thoracic Endovascular Registry (MOTHER) database	*Circulation*	2013	23.603	Benjamin Patterson	22
23493319	Acute aortic dissection determines the fate of initially untreated aortic segments in Marfan syndrome	*Circulation*	2013	23.603	Florian S. Schoenhoff	16
23599348	Population-based study of incidence and outcome of acute aortic dissection and premorbid risk factor control: 10-year results from the Oxford Vascular Study	*Circulation*	2013	23.603	Dominic P. J. Howard	90
24002714	Acute aortic syndrome	*Circulation*	2013	23.603	Azeem S. Sheikh	13
24025592	Type A aortic dissection after nonaortic cardiac surgery	*Circulation*	2013	23.603	Olaf Stanger	3
24025593	A perfect storm: type A aortic dissection and previous cardiac surgery	*Circulation*	2013	23.603	Joseph C. Cleveland Jr	2
24030403	Stroke and outcomes in patients with acute type A aortic dissection	*Circulation*	2013	23.603	Eduardo Bossone	20
24030404	Outcomes of aortic arch reconstruction with acute type A aortic dissection in the setting of prior cardiac surgery: an analysis from the International Registry of Acute Aortic Dissection	*Circulation*	2013	23.603	Nicholas R. Timan	2
24030416	Longevity after aortic root replacement: is the mechanically valved conduit really the gold standard for quinquagenarians?	*Circulation*	2013	23.603	Christian D. Etz	6
24126326	Shifting calcium plaque in progressive aortic dissection	*Circulation*	2013	23.603	Takashi Koyama	0
24594629	Type A aortic dissection in Marfan syndrome: a case for more aggressive and extensive surgery at the time of the initial surgical operation	*Circulation*	2014	23.603	Marzia Leacche	0
24594630	Type A aortic dissection in Marfan syndrome: extent of initial surgery determines long-term outcome	*Circulation*	2014	23.603	Bartosz Rylski	15
24807872	Endothelial cell-specific reactive oxygen species production increases susceptibility to aortic dissection	*Circulation*	2014	23.603	Lampson M Fan	34
24807873	The endothelium: paracrine mediator of aortic dissection	*Circulation*	2014	23.603	Francesca Seta	3
24867998	Type A aortic dissection mimicking a saddle pulmonary embolus on computed tomographic angiography	*Circulation*	2014	23.603	Kavita Bhatt	0
25200054	Outcomes of acute retrograde type A aortic dissection with an entry tear in descending aorta	*Circulation*	2014	23.603	Joon Bum Kim	5
25200055	Predicting in-hospital mortality in acute type B aortic dissection: evidence from International Registry of Acute Aortic Dissection	*Circulation*	2014	23.603	Jip L. Tolenaar	19
25223775	The "right" false—efficient, left main coronary artery in a patient with acute type A aortic dissection	*Circulation*	2014	23.603	Woon Heo	0
25366834	Morphologic characteristics for treatment guidance in uncomplicated acute type B aortic dissection	*Circulation*	2014	23.603	Martin Teraa	1
25394733	Mortality from thoracic aortic diseases and associations with cardiovascular risk factors	*Circulation*	2014	23.603	David Sidloff	11
25888682	Incidence, Management, and Immediate- and Long-Term Outcomes After Iatrogenic Aortic Dissection During Diagnostic or Interventional Coronary Procedures	*Circulation*	2015	23.603	Iván J. Núñez-Gil	16
26015467	Aortic Dissection Manifesting as ST-Segment–Elevation Myocardial Infarction	*Circulation*	2015	23.603	Alexander Chen	1
26034086	Pulmonary artery dissection caused by extension of a chronic type a aortic dissection through a patent ductus arteriosus	*Circulation*	2015	23.603	Hao Hong	1
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