

Publication Trends In Pars Plana Vitrectomy In The Last Decade

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ABSTRACT

Purpose: The aim of this study was to demonstrate the publication trends in the area of pars plana vitrectomy (PPV) in the last ten years.

Materials and Methods: All of the PPV related research articles, case reports, letters, reviews and meeting abstracts published between January 2009 and December 2018 indexed on the Web of Science Core Collection were evaluated. A bibliometric filter was used to capture publications about PPV by using the key words 'pars plana vitrectomy', 'retina surgery' and 'vitreous surgery' in the 'topic' selection mode. Publication years, topics, document types, authors, languages, country origins, institutions, citations and journals of the published documents were evaluated.

Results: A total of 4877 publications was evaluated in this bibliometric study. The total publication counts about PPV had been increased from the year 2009 (368 documents) to 2018 (607 documents). The mostly encountered topics were PPV combined with an anterior segment procedure (670 documents, 13.7%), rhegmatogenous retinal detachment (393 documents, 8.1%), and macular hole (388 documents, 8.0%). The most published document type were research articles and case reports (4029 documents, 82.6%). University of London was the most productive institution (131 documents, 2.7%). The journal that published the most about PPV was 'Retina' (615 documents, 12.6%). The average citation count per PPV document was 7.9.

Conclusions: In the area of PPV related publications, the most encountered topics were PPV combined with an anterior segment procedure and rhegmatogenous retinal detachment surgery in the last decade.

Key Words: Bibliometric analysis, Pars plana vitrectomy, Publication trends, Vitreous.

INTRODUCTION

Pars plana vitrectomy (PPV) is one of the most commonly performed intra-ocular surgery. PPV is the primary surgical technique for addressing retinal diseases. There have been substantial improvements about PPV techniques in the last thirty years.^{1,2} As an unfavorable situation for PPV is the need of specific and expensive instruments and devices to perform it.

In this study, a bibliometric analysis of PPV related documents published in the last ten years was done. In recent years, bibliometrics has increasingly been applied to the evaluation of research. Bibliometric studies reveal the most productive authors, institutions, countries, etc. about

a specific topic.^{3,4} Bibliometric studies may also reflect the efficiency of the scientific papers by citation analysis.³ In addition, these studies would be useful for mapping the development of new fields of science.

In the present study, we aimed to demonstrate the scientific publication trends related to PPV in the last decade. In addition, we tried to document all of the PPV related complications by evaluating the published papers. In the last years, there is a growing interest in this surgery among the ophthalmologists all over the world. We also searched for the hot topics related to PPV, since it would be helpful for retina specialists to be aware of those.

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MATERIALS AND METHODS

All of the PPV related research articles, case reports, letters, reviews and meeting abstracts published between January 2009 and December 2018 indexed on the 'Web of Science Core Collection' were analyzed. A bibliometric filter, capturing PPV related publications from the Web of Science database by using the key words 'pars plana vitrectomy' or 'vitreous surgery' in the 'topic' selection mode was created. The documents which met the mentioned criteria were examined and categorized according to the indications of PPV and the aims of the studies. The database search was performed on February 2019. The authors of the present manuscript evaluated all of the documents and decided inclusion or exclusion of the papers. Language restriction was not applied. This paper does not report on the use of animal or human information and this manuscript is not subject to approval of the ethics committee.

PPV related publications were categorized according to their topics (i.e., PPV combined with an anterior segment surgery, PPV combined with a band cerclage, PPV combined with an intravitreal anti-VEGF or steroid injection, effects of PPV on ocular physiology, macular hole, ocular trauma, rhegmatogenous retinal detachment, dropped or dislocated lens fragments or intraocular lens, endophthalmitis, instrumentation, diabetic retinopathy, sclerotomy, uveitis, tumors, vitreous floaters, macular edema, epiretinal membrane, vitreomacular traction, optic pit maculopathy, malign glaucoma, proliferative vitreoretinopathy, intraocular foreign bodies, endotamponades, PPV complications, comparison of 20-23-25-27 gauge PPVs, animal studies, general pathologies, miscellaneous). If publications were based on animal experiments or veterinary research, these types of documents were categorized under 'animal studies'. The 'general pathologies' category represented publications covering multiple PPV indications with an outcome measure of anatomical and functional success. The 'miscellaneous' category consisted of publications about Morning Glory syndrome, sub-internal limiting membrane (ILM) hemorrhage, myopic foveoschisis, Coats disease, suprachoroidal hemorrhage, asteroid hyalosis, von Hippel Lindau disease, retinopathy of prematurity, retinal vein occlusions, serous retinal detachment, Terson disease, retinoschisis, retinal prosthesis, stem cell injections, familial exudative vitreoretinopathy, vitreous amyloidosis, Valsalva retinopathy, gene therapy, Eales disease, sheathotomy, persistent fetal vasculature, choroidal neovascular membrane, acute retinal necrosis, choromovitreotomy, retinal biopsy, sub-macular hemorrhage, macroaneurysms, sickle cell anemia, oral anticoagulants, ocular pain, anesthesia, ocular hypothermia, siderosis, and ghost cell glaucoma.

This bibliometric study also included quantitative data about document types, authors of the publications, journals, languages, institutions, country origins of the publications and average citation counts. The publications limited to only medical retinal diseases, pneumatic retinopathy, intravitreal injections or band cerclage without mentioning vitrectomy were excluded. Unpublished documents were excluded if published papers were available in the same study.

In the present research, we focused mostly on table and graphical presentations of the data rather than statistical calculations. Microsoft Excel 2010 was used to draw graphics. The Statistical Package for the Social Sciences (SPSS) 22.0 software for Windows (SPSS Inc., Chicago, IL, USA) was used to analyze yearly quantitative distributions of PPV documents. A *p* value lower than 0.05 was considered to be statistically significant.

RESULTS

A total of 4877 publications was evaluated in this bibliometric study. The categorization and publication counts of PPV related documents according to the topics are shown in **Table 1**. The hot topics about PPV were noted as PPV combined with an anterior segment surgery (13.7%), rhegmatogenous RD (8.1%), macular hole (8.0%), endophthalmitis (7.1%), and diabetic retinopathy (4.3%). The number of PPV publications was nearly doubled in the last ten years from 2009 to 2018 as shown in **Figure 1**. As the years increased the number of publications also increased ($r=0.90$, $p<0.001$). On the other hand, the number of topics related to PPV remained similar in proportion through the years in the last decade.

The most used language was English (4639 documents, 96.9%). The top five countries that published documents related to PPV were shown in **Figure 2** and the USA was the leading country in this category (1247 documents, 25.6%). There were 210 publications (4.3% of total publications) about PPV from Turkey in the last decade. The most published document types were as follows; research articles and case reports (4029 documents, 82.6%), reviews (348 documents, 7.1%) and meeting abstracts (235 documents, 4.8%). Flynn HW from USA was the most productive author (65 documents, 1.3%). University of London was the most productive institution (131 documents, 2.7%), followed by University of California (129 documents, 2.6%) and Bascom Palmer Eye Institute (117 documents, 2.4%). The top five journals that published papers related to PPV were shown in **Figure 3** and the 'Retina' journal was on the top of the list (615 documents, 12.6%). The average citation count per PPV publication was 7.9.

The reported complications of PPV in the published

Table 1. The categorization and publication count of pars plana vitrectomy related documents according to the topics are shown.

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Macular hole	59	65	37	35	42	37	22	34	23	34
ERM	23	31	20	30	20	20	9	15	11	8
VMT	9	8	15	9	10	14	7	5	8	4
Optic pit maculop.	6	13	5	5	2	7	2	2	1	1
Macular edema	9	11	16	14	7	18	15	10	11	15
Rhegmat. RD	63	49	57	44	40	35	35	21	25	24
PVR	7	9	11	3	13	7	3	2	6	3
DRP	23	26	27	27	19	13	18	18	26	12
Steroid / anti-VEGF	13	21	14	11	11	12	9	19	20	11
Uveitis	15	21	19	20	10	18	9	12	13	9
Endophthalmitis	47	44	40	41	36	28	16	25	37	33
Tumors	11	13	4	9	18	11	4	5	7	10
Dislocated lens	3	7	6	13	9	12	12	10	7	7
Vitreous floaters	4	7	6	9	6	4	1	5	3	2
IOFB	16	7	4	6	4	4	1	7	3	4
Ocular trauma	14	12	14	9	7	7	6	15	4	9
Refract. glaucoma	7	2	2	7	4	2	4	1	3	0
Ant. segm. surg.	97	84	89	83	63	59	45	44	53	53
Endotamponades	14	25	16	6	24	13	11	19	15	13
20-23-25-27 g com.	9	6	5	9	6	9	10	12	12	15
Physiology	4	22	21	19	19	18	8	10	11	7
Instrumentation	18	16	20	15	13	13	6	11	17	17
Band cerclage	12	8	11	15	10	7	6	8	7	7
Sclerotomy	4	3	3	5	5	7	8	14	13	7
Animal studies	9	26	12	8	14	15	8	16	9	11
Complications	23	22	22	22	16	18	17	16	19	10
General pathol.	16	11	14	6	9	10	6	10	11	8
Miscellaneous	72	55	57	65	63	67	48	49	45	34
Total count	607	624	567	545	500	485	346	415	420	368

ERM: epiretinal membrane, VMT: vitreomacular traction, maculop.: maculopathy, Rhegmat. RD: rhegmatogenous retinal detachment, PVR: proliferative vitreoretinopathy, DRP: diabetic retinopathy, VEGF: vascular endothelial growth factor, IOFB: intra-ocular foreign body, Refract.: refractory, Ant. Segm. Surg.: anterior segment surgery, g com.: gauge comparison, pathol.: pathology.

documents were ocular hypotonia, retinal breaks, endophthalmitis, retained subretinal or anterior chamber perfluorocarbon liquids, optic neuropathy, epiretinal membrane formation, proliferative vitreoretinopathy, vitreous haemorrhage, retinal haemorrhage, choroidal cracks, persistent corneal epithelial defect, refractory macular edema, air embolism, vitreous floaters, cataract, glaucoma, iris neovascularization, retinal detachment, posterior capsule opacification, vision loss, scotoma, sympathetic ophthalmia, retinal vasculitis, lens dislocation, macular hole, orbital emphysema, necrotizing scleritis, retinal macrocyst, aqueous misdirection, phototoxicity,

entoptic phenomenon, retinal folds, scleral abscess, conjunctival inclusion cyst, ophthalmic artery occlusion, metamorphopsia, conjunctival pigmentation, silicon oil migration, choroidal detachment, astigmatism, sclerotomy leakage, band keratopathy, silicon oil emulsification, residual vitreous traction, retinal incarceration, and fibrin reaction.

DISCUSSION

The results of the present study show that the hottest topic in PPV related publications is the combined surgery of PPV

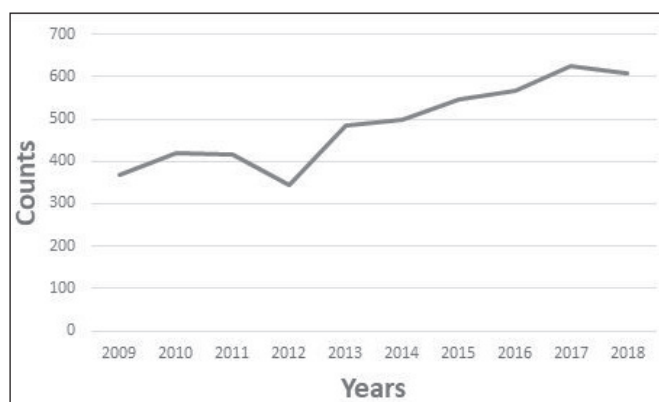


Figure 1. The graphic for showing publication counts related to PPV documents through the years 2009 and 2018.

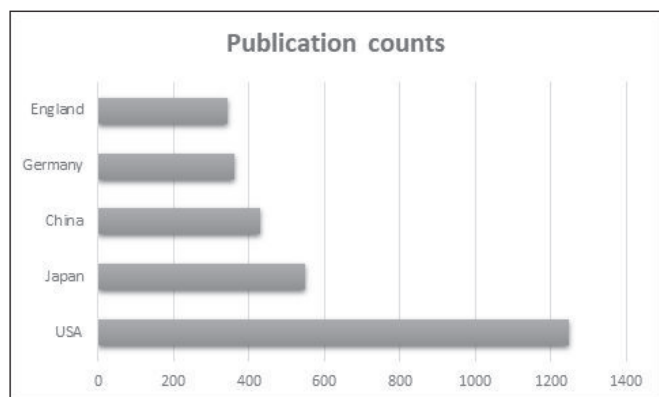


Figure 2. The graphic for showing the most productive countries about PPV related publications.

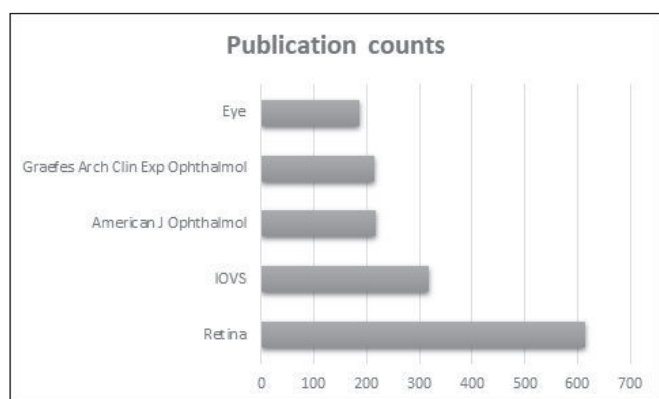


Figure 3. The graphic for showing the scientific journals which published the most about PPV.

with an anterior segment procedure. That outcome might be due to the attempts to fill the gap in the literature about combined surgeries. Also, there are many kinds of anterior segment surgeries to be performed together with PPV. Since there are still undiscovered issues about combined procedures, the number of publications related to this area is likely to increase in the following years.

There are not many bibliometric studies in the ophthalmology area.⁵⁻¹⁰ Bibliometric studies serve to reveal the effectiveness of scientific publications about a specific topic. Since PPV is the second most common intra-ocular surgery following phacoemulsification, it may be useful to demonstrate the publication trends about it. In the last ten years, retinal detachment and macular hole surgeries have become the other hot topics about which the retinal specialists most published, besides combined procedures.

PPV with 27-gauge instruments have become popular in the last 5 years.¹¹ The advantages of very small gauge vitrectomy include reduced surgical times, faster visual recovery, less tissue manipulation, less postoperative inflammation and pain.¹¹ According to our results, comparison of different vitrectomy gauges is not a very hot topic in this area with 93 documents (2%) in the last decade.

In the present study, complications encountered during or after PPV were also reported. It seems that many more complications exist than written in the classic textbooks. The publications about PPV complications were generally noticed as an attractive topic through the years. Since PPV is an evolving surgical area, it may be expected to see more documents about PPV complications in the next years.

The United States of America was the most productive country for PPV related scientific documents. As an internationally accepted common scientific language, English was the most used. As the main way of scientific information sharing, original research articles were the most published document types. University of London was the leading institution in the aspect of PPV related document counts in the last decade.

The present study has several limitations. First, to give more details, it was not possible to read the full texts of all the articles published. Second, the parameter types evaluated in bibliometric studies are limited to the database program options. Third, more databases other than Thomson Reuters Web of Science might be included. Last, the publication trends in the last 30 years may be evaluated in further studies.

In conclusion, there is a growing interest to publish documents about PPV in the last decade. The gradually increasing number of PPV documents may be due to the increased interest in this surgery or the increased number of scientific journals publishing the related documents. Also, it might be said that those documents get considerable amount of citations. There is a tendency to smaller gauge PPV in the last years.

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