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Effect of resident participation in ophthalmic surgery on wound dehiscence: A meta-analysis

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Abstract

Background:
Meta-analysis research was implemented to appraise the effect of resident participation (RP) in ophthalmic surgery (OS) on wound dehiscence (WD).

Methods:
Inclusive literature research until April 2023 was done, and 645 interconnected researches were revised. The 7 picked researches, enclosed 4224 OS persons were in the utilized researchers' starting point, 2189 of them were utilizing RP, and 2035 were no RP. Odds ratio (OR) and 95% confidence intervals (CIs) were utilized to appraise the consequence of RP in OS on WD by the dichotomous approach and a fixed or random model.

Results:
RP had significantly higher WD (OR, 1.69; 95% CI, 1.04-2.76, p=0.03) compared to no RP in OS persons.

Conclusions:
RP had significantly higher WD compared to no RP in OS persons. However, caution needs to be taken when interacting with its values since there was a low sample size of some of the chosen researches and a low number of researches found for the comparison in the meta-analysis.

Keywords: ophthalmic surgery; resident participation; none resident participation; wound dehiscence

Introduction

Ophthalmology residencies, which include years of postgraduate training in different countries, must include surgical training. In these certified ophthalmology residencies, surgical training normally takes place in the last year, with different quantities taking place in the preceding years.[1] Prior to engaging in solo ophthalmology practice, residents must first demonstrate surgical technique-based competence in their residency program. It is critical to determine if resident physicians' hands-on surgical training influences surgical consequences and patient surgical problems rates from education and public health perspectives. [2] The influence on patient consequences with and without resident participation (RP) in ophthalmology is still debatable, despite several researches evaluating the impacts of RP in a variety of other specialties. According to a recent meta-analysis by De Souza and colleagues, [3] resident-led surgeries were longer to complete and had a higher comparative risk of mild, self-limiting problems. This article, though, also comprised researches from other specialties besides ophthalmology, and though [4] ophthalmology researches were included in a sub-analysis, [4-6] there has been a noticeably greater number of researches contrasting ophthalmic surgery (OS) performed by resident physicians versus those performed by attending physicians. Only a small number of recent researches compared RP influences on surgical consequences and problems with the presence physicians through multiple OS. Recent studies have analyzed resident participation and results in particular OS types. Additionally, the present meta-analysis distinguishes between trials with propensity score participants and those without. In comparison to OS where attending physicians serve as the primary surgeons, the purpose of this meta-analysis was to define the impact of RP on wound dehiscence (WD). The term "resident-led" refers to surgeries when a resident doctor is labeled as the primary surgeon, as opposed to "attending-led" procedures where

an attending doctor is described as a major surgeon. We performed a meta-analysis of the existing research to further define the question. This meta-analysis aimed to appraise the effect of RP in OS on WD.

Methods

Eligibility criteria

The research demonstrating the effect of resident participation in OS on WD was selected in order to create an overview. [7]

Information sources

The entire research is represented in Figure 1. The literature was inserted into the meta-analysis when the inclusion criteria were met:

1. The investigation was observational, prospective, retrospective, or randomized controlled trial (RCT) research.
2. RP in OS were the investigated picked persons.
3. The intervention was an RP.
4. The research appraised the outcome of the effect of RP in OS on WD.

The research was excluded if the comparison significance was not emphasized in it, research that didn't check the characteristics of the consequence of the effect of RP in OS on WD and research on no RP in OS without RP.

Search strategy

A search protocol operations were recognized based on the PICOS view, and we characterized it as next: "population" for persons with OS, P; RP is the "intervention" or "exposure," while the "comparison" was between RP and no RP; WD, bile spillage, fascial extension, postoperative collection, and port site hernia was the "outcome" and, "research design" the planned research had no boundaries. [8]

We have searched Google Scholar, Embase, Cochrane Library, PubMed, and OVID databases thoroughly till April 2023 utilizing an organization of keywords and supplementary keywords for ophthalmic surgery; resident participation; none resident participation; and wound dehiscence as revealed in Table 1. To evade an investigation from being unsuccessful to create a connection between the effects of RP in OS on WD, paper replications were removed, they were grouped into an EndNote file, and the titles and abstracts were reevaluated.

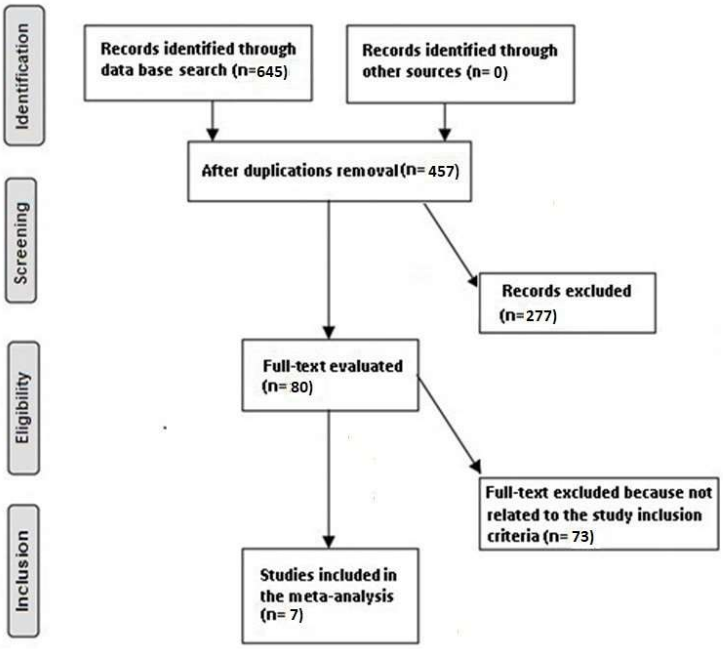

Figure 1 A flowchart of the research process.

Selection process

The procedure that followed the epidemiological declaration was later organized and analyzed utilizing the meta-analysis method.

Data collection process

The first author's name, the research data, the research year, the country or area, the population kind, the medical and treatment physiognomies, categories, the quantitative and qualitative estimation procedure, the data source, the outcome estimation, and statistical analysis were some of the criteria utilized to collect data. [9]

Data items

We separately collected the data based on an assessment of the consequence of RP compared to control for no RP in OS on WD when research had varying values.

Table 1. Search Strategy for Each Database

Database	Search strategy
Pubmed	#1 "ophthalmic surgery"[MeSH Terms] OR "wound dehiscence"[MeSH Terms] [All Fields] #2 "resident participation"[MeSH Terms] OR "none resident participation"[MeSH Terms] [All Fields] #3 #1 AND #2
Embase	'OS'/exp OR 'wound dehiscence' #2 'resident participation'/exp OR 'none resident participation' #3 #1 AND #2
Cochrane library	(OS) :ti,ab,kw (wound dehiscence):ti,ab,kw (Word variations have been searched) #2 (resident participation):ti,ab,kw OR (none resident participation):ti,ab,kw (Word variations have been searched) #3 #1 AND #2

Research risk of bias assessment

To determine whether each research may have been biased, the author independently appraised the methodology of the picked articles. The "risk of bias instrument" from the Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 was utilized to measure procedural quality. Each research was assigned one of the following bias risks after being categorized by the appraisal criteria: If all of the quality requirements were met, the research was classified as having a low bias risk; if one requirement wasn't met or wasn't encompassed, research was classified as having a medium bias risk. If more than one quality requirements were wholly or partially unmet, the research was assessed to have a considerable bias risk.

Effect estimates

Only research that estimated and described the effect of RP compared to no RP in OS on WD underwent sensitivity analysis. To compare RP to no RP in OS of WD persons' sensitivity, a subclass analysis was utilized.

Synthesis methods

The odds ratio (OR) and a 95% confidence interval (CI) were calculated utilizing a random- or fixed-effect model and a dichotomous approach. The I2 index was calculated between 0 and 100%. No, low, moderate, and high heterogeneity were evident for the values at 0%, 25%, 50%, and 75%, respectively. [10] Other structures that display a strong degree of alikeness among the connected investigation were also analyzed to be confident the precise model was utilized. When I2 was 50% or higher, the random effect was employed; if I2 was <50%, the option of utilizing fixed-effect rose. [10] By dividing the initial estimation into the aforementioned consequence groups, a subclass analysis was carried out. In order to define the statistical significance of differences among subcategories, a p-value of less than 0.05 was utilized in the analysis.

Reporting bias assessment

The Egger regression test and funnel plots that show the logarithm of the ORs vs. their standard errors were utilized to quantitatively and qualitatively quantify investigation bias. Investigations bias was declared present if $p \geq 0.05$.[11]

Certainty assessment

Each p-value was inspected utilizing two-tailed testing. Utilizing Reviewer Manager Version 5.3, graphs and statistical analyses were created (The Nordic Cochrane Centre, the Cochrane Collaboration, Copenhagen, Denmark).

Results

7 papers, published between 2007 and 2019, from a total of 645 linked researches that met the inclusion criteria were chosen for the meta-analysis. [12-18] The consequences of these investigations are accessible in Table 2. 4224 OS persons were in the utilized researchers' starting point, 2189 of them were utilizing RP, and 2035 were no RP. The sample size was 114 to 2487 persons.

RP had significantly higher WD (OR, 1.69; 95% CI, 1.04-2.76, p=0.03) with no heterogeneity ($I^2 = 0\%$) compared to no RP in OS persons as revealed in Figure 2.

The utilization of stratified models to examine the effects of specific components was not possible due to a lack of data, e.g. age, gender, and ethnicity, on comparison outcomes. No evidence of research bias was found (p = 0.89) operating the quantitative Egger regression test and the visual interpretation of the funnel plot as shown in Figure 3. Though, it was discovered that the mainstream of the implicated RCTs had poor procedural quality and no bias in selective reporting.

Table 2. Characteristics of the selected researches for the meta-analysis

Research	Country	Total	Resident-led surgeries	No resident-led surgeries
Troutbeck, 2007 [12]	Australia	290	95	195
Kwong, 2014 [13]	USA	114	85	29
Finn, 2016 [14]	USA	2487	1385	1102
Moustafa, 2018 [15]	USA	233	65	168
Thangamathesvaran, 2018 [16]	USA	120	60	60
Chen, 2019 [17]	USA	144	72	72
Hellman, 2019 [18]	USA	836	427	409
	Total	**4224**	**2189**	**2035**

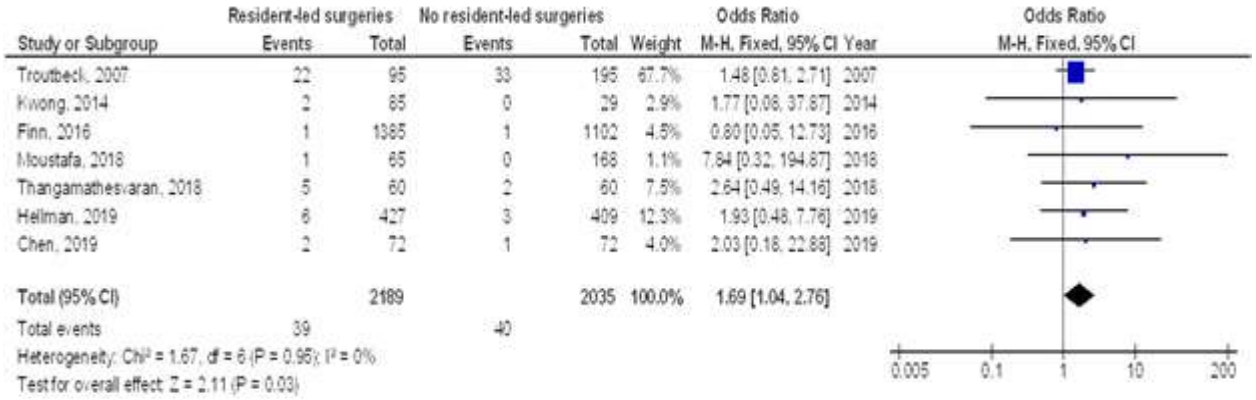

Figure 2. The effect's forest plot of the RP compared to control on WD in no RP in OS

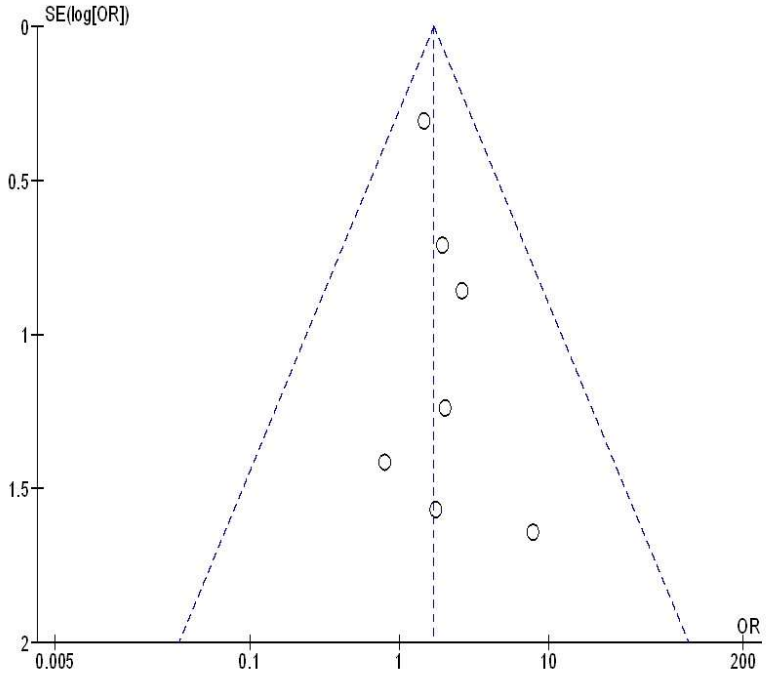

Figure 3. The funnel plot of the RP compared to control on WD in no RP in OS

Discussion

In the research that was utilized for the meta-analysis, 4224 OS persons were in the utilized researchers' starting point, 2189 of them were utilizing RP, and 2035 were no RP. [12-18] RP had significantly higher WD compared to no RP in OS persons. However, when interacting with its values, caution must be taken since a low sample size of some of the chosen researchers was found for the comparison in the meta-analysis (3 out of 7 ≤200 persons), and

the low number of the chosen researches for the comparison. The degree of relevance of the evaluation would be impacted by that.

The clinical consequences of both groups were generally safe, efficient, and similar. According to D'Souza and colleagues' [3] findings, greater operating times were anticipated in resident-led surgeries, perhaps as a result of the need for education and resident physicians' varying levels of experience throughout these procedures. The authors also point out that there was not a uniform rise in the likelihood of an unanticipated return to the operating room across all investigations. Arfeen and Colleges [19] and Welch and Colleges [5] were two researches that revealed a greater return to the operating room and recommended that surgical problems were generic and principally manifested in the initial postoperative period. However, no wound was evaluated in both researches. Further research is necessary to ascertain the correctness of this ambiguous finding because of the small sample sizes. If not, it may imply an increased financial load on the healthcare system and the patients. Although there were more choroidal effusions after trabeculectomy, there were no conclusive signs of ocular hypotony. The results of glaucoma surgery appear to be conflicting, which calls for more research into the validity and foundation of this discovery. Given the absence of difference in hypotony between the two groups and the frequent association between choroidal effusion and severe hypotony caused by hyper-filtration after trabeculectomy, more research should be done to verify whether this finding is replicable. The authors also mention that the propensity matching for these [2] comprised researches was not done. Choroidal effusions can be self-limiting, [20, 21] and they can be treated surgically and medically with promising results, [22] particularly if precautions are taken both during and after surgery to prevent choroidal effusions and to properly screen for signs of hyper-filtration. Future research comparing consequences before and after the extensive usage of simulators, like the EyeSi system, might also help improve surgical consequences in the future as a result of the widespread deployment of surgical simulation tools. [22-24] Our research concludes that RP in OS appears safe, successful, and similar to attending-led procedures with particular results of low or ambiguous clinical importance in the present residency program state. It is advised that more research be conducted in order to understand better and continuously improve surgical consequences, in addition to the ongoing post-surgery care that doctors must provide in order to maintain the standard of care first delivered to their patients after their operation.

This meta-analysis presented the influence of RP and control on WD in the management of OS persons. [25, 26] More examination is still necessary to illuminate these possible impacts. [27-33] This was similarly emphasized in former research that utilized a connected meta-analysis practice and originated comparable values of the impact. [34] Though the meta-analysis was unable to determine if differences in these variables are connected to the research results, properly-led RCTs must take these factors into account in addition to the variety of diverse ages, gender, and ethnicities of people. [35-38] In conclusion, RP had significantly higher WD compared to no RP in OS persons.

Limitations

There might have been assortment bias since several of the researchers chosen for the meta-analysis were excluded. Though, the removed research did not encounter the requirements for inclusion in the meta-analysis. Furthermore, we lacked the knowledge to assess whether parameters like age, gender, and ethnicity affected outcomes. The goal of the research was to determine the effect of RP in OS on WD. Due to the inclusion of inaccurate or missing data from previous research, bias might have been amplified. The persons' nutritional state in addition to their race, gender, and age were probable causes of bias. Inadvertently distorted values may result from missing data and some unpublished work.

Conclusions

RP had significantly higher WD compared to no RP in OS persons. However, when interacting with its values, caution must be taken since a low sample size of some of the chosen researchers was found for the comparison in the meta-analysis (3 out of 7 ≤200 persons), and the low number of the chosen researches for the comparison. The degree of relevance of the evaluation would be impacted by that.

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