

Review Article

# Recurrence Rate and Morbidity after Ultrasound-guided Transvaginal Aspiration of Ultrasound Benign-appearing Adnexal Cystic Masses with and without Sclerotherapy: A Systematic Review and Meta-analysis

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**ABSTRACT Objective:** To determine the pooled recurrence rate of benign adnexal masses/cysts (namely simple cyst, endometrioma, hydrosalpinx, peritoneal cyst) after transvaginal ultrasound-guided aspiration, with or without sclerotherapy.

**Data Sources:** Search of studies published in PubMed and Web of Science databases between January 1990 and December 2020.

**Methods of Study Selection:** A systematic search strategy was done using Medical Subject Heading terms. Only randomized trials and prospective studies published in English language were included.

**Tabulation, Integration, and Results:** A total of 395 articles were screened. After applying inclusion and exclusion criteria, 20 studies were included in this review comprising data from 1386 patients with a mean follow-up of 11.4 months (range 0.5–26.5 months). The overall pooled rate of recurrence of adnexal masses was 27%, (95% confidence interval [CI], 18%–39%). Recurrence rate was significantly higher after only aspiration than after sclerotherapy (53%; 95% CI, 46%–60% vs 14%; 95% CI, 8%–22%;  $p < .001$ ). However, a high heterogeneity across the studies was found. A total of 10 major complications were recorded in the different publications.

**Conclusion:** In a selected population, aspiration with sclerotherapy had a lower recurrence rate than aspiration without sclerotherapy. However, these results should be interpreted with caution given the heterogeneity of the studies and the paucity of randomized controlled trials. Regarding the adoption of this procedure in routine clinical practice, we believe that aspiration should be considered an experimental procedure as there are few studies addressing long-term recurrence rate, and data comparing this technique with surgical cystectomy are lacking. Journal of Minimally Invasive Gynecology (2021) 00, 1–9. © 2021 AAGL. All rights reserved.

**Keywords:** Adnexal mass; Drainage; Ultrasound-guided aspiration; Sclerotherapy

An adnexal mass is a common finding in daily clinical practice [1]. At least 10% of these adnexal masses will be

surgically managed, usually by laparoscopy [2,3]. This approach is relatively safe, but complications may occur in approximately 2.1% of patients when single-port technique is used [4]. Ultrasound-guided (US) aspiration of adnexal cysts has been used in gynecology for decades [5]. Despite the potential benefits of this technique, such as no need for anesthesia, low cost, and in an office setting, its implementation has not been widely accepted mainly because of concerns about its efficiency and safety [6–8].

US aspiration has shown a quite variable recurrence rate, ranging from 7.5% to 83.3% [7–9]. However, with

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sclerotherapy, the recurrence rate reported is lower, although this issue has not been addressed to date through a systematic review [10]. Different agents (ethanol, methotrexate, tetracycline, lauromacrogol, alcohol-erythromycin combination, and interleukin 2) have been used [10–13].

Two already published meta-analysis have reviewed the role of aspiration [14] and sclerotherapy [15] in the management of endometriomas. However, to the best of our knowledge, there are no previous meta-analyses analyzing the recurrence of the procedure with and without sclerotherapy in relation to benign cysts. Adding a sclerosant agent could decrease recurrence rates of adnexal masses [6,12,15–17]. It has been mostly studied in the context of endometriosis [6,8,12,14–17].

The aim of this review was to systematically search, collect, summarize, and evaluate the pooled recurrence rate of a benign adnexal mass or cyst after aspiration with or without sclerotherapy.

## Methods

### *Registration and Search Strategy*

A systematic review and meta-analysis according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses statement ([www.prisma-statement.org](http://www.prisma-statement.org)) [18] were performed. The inclusion and exclusion criteria for the selection of studies, as well as data extraction and quality assessment methods, were defined before the start of the search. Institutional review board approval was waived because of the work's nature and design. We did not register the protocol. This meta-analysis had no funding.

A search of studies published between January 1990 and December 2020 was conducted as a first step by 2 investigators on an independent basis. An exhaustive search strategy was done through PubMed and Web of Science databases using Medical Subject Heading terms and Boolean operators. The search was limited to articles published in English.

The terms used for searching through PubMed were as follows: (Vaginal[Title/Abstract] OR transvaginal [Title/Abstract] OR endovaginal[Title/Abstract]) AND (aspiration[Title/Abstract] OR “Ultrasonography Interventional”[Mesh] OR “Ultrasound Interventional”[Title/Abstract] OR “Interventional Ultrasound”[Title/Abstract] OR “Interventional Ultrasonography”[Title/Abstract] OR “Drainage Suction”[Title/Abstract] OR “Drainages Suction”[Title/Abstract] OR “Suction Drainage”[Title/Abstract] OR “Suction Drainages”[Title/Abstract] OR “Suction”[Mesh][Title/Abstract] OR drainage[Title/Abstract] OR “Drainage”[Mesh] OR puncture[Title/Abstract] OR “Punctures”[Mesh] OR sclerotherapy[Title/Abstract] OR “Sclerotherapy”[Mesh]) AND (“adnexal mass”[Title/Abstract] OR “adnexal masses”[Title/Abstract] OR “adnexal-masses”[Title/Abstract] OR “adnexal cyst” [Title/Abstract] OR “adnexal diseases”[Mesh] OR

“ovarian cyst”[Title/Abstract] OR “ovarian cysts”[Title/Abstract] OR “ovarian mass”[Title/Abstract] OR “ovarian masses”[Title/Abstract] OR “ovarian cysts”[Mesh] OR “parovarian cyst”[Mesh] OR “cyst parovarian”[Title/Abstract] OR “cysts parovarian”[Title/Abstract] OR “parovarian cysts”[Title/Abstract] OR “paratubal cyst” [Title/Abstract] OR “cysts paratubal”[Title/Abstract] OR “paratubal cysts”[Title/Abstract])

The terms used for the search in Web of Science included “cyst aspiration ovarian transvaginal” and “sclerotherapy ovarian cyst.”

### *Study Selection*

After searching both databases, 2 reviewers screened the results to exclude duplicate articles. Reviews, guidelines, observational retrospective studies, letters to the editors, case reports, small population studies (set arbitrarily as <15 patients), and articles not dealing with the investigated topic were excluded after reading the titles and abstract. Of the remaining publications, 2 investigators reviewed the full text on an independent basis. The criteria to identify potentially eligible articles were as follows: randomized trials or prospective cohort observational studies that specified the recurrence rate of adnexal masses after US-guided transvaginal aspiration with or without sclerotherapy. Publications in which the study population were not humans were excluded. In addition, those that reported transabdominal aspiration only or mostly (set as >20% of the sample) and studies that did not specify the number of patients who underwent US-guided transvaginal aspiration vs transabdominal aspiration were excluded. We decided doing so because the complication rate could vary between the transabdominal and transvaginal approaches.

The reference lists of included articles were reviewed to identify any additional relevant publication. The corresponding author for a study was contacted because of missing data.

### *Data Extraction and Quality Assessment*

Two reviewers independently extracted data for each article definitely included. The extracted data were as follows:

Demographic and baseline data: study's design (observational retrospective study, observational prospective study, randomized controlled trial), type of sampling (consecutive or not), type of lesion aspirated (simple cyst, endometrioma, hydrosalpinx, and other benign histology such as dermoid cyst or peritoneal cyst), size of adnexal mass, and the number of patients treated.

Outcome data: the number of patients who had a recurrence; criteria for recurrence; median follow-up time; range of follow-up; losses of patients recorded along the follow-up; number of control scans after the procedure; sclerotherapy (yes/no); and the type of sclerosant agent, overall

morbidity, and specific morbidity (fever, infection, hemorrhage, pain, other side effects); the number of punctures made; and cytologic analysis of the liquid content aspirated. In the case of discrepancy between these 2 investigators, a decision was made by consensus.

Two researchers made a qualitative assessment of the publications using the Newcastle-Ottawa Scale based on the domains of “Selection,” “Comparability,” and “Outcome” [19]. The selection domain includes 4 items: representativeness of the exposed cohort, whether the non-exposed is drawn from the same community as the exposed cohort, ascertainment of the exposure, and demonstration that the outcome of interest was not present at the start of the study (it can add up to 6 stars). The comparability domain includes 1 item: comparability according to control for confounders (it can add up to 2 stars). The outcome domain includes 3 items: assessment of the outcome, enough follow-up time, and adequacy of follow-up (it can add up to 5 stars). The Newcastle-Ottawa Scale classifies studies as good quality (3 or 4 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome domain), fair quality (2 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome domain), and poor quality (0 or 1 star in selection domain, OR 0 stars in comparability domain, OR 0 or 1 stars in outcome domain). Disagreements were solved by discussion between the 2 researchers.

### Statistical Analysis

Statistical analysis was performed using the software R (Development Core Team, Vienna, Austria) and the pack “meta” [20]. The rate of recurrence after the procedure in each of the included studies was calculated. To calculate the 95% confidence intervals (CI) for individual publications the Clopper-Pearson test was used. We used a continuity correction of 0.5 for articles in which no patient had a recurrence.

Pooled estimates of the recurrence rate with the corresponding 95% CIs were calculated using the random-effects model. Then, patients were stratified into 2 groups according to if sclerotherapy was used and the pooled estimates of the recurrence rate in each group with the corresponding 95% CI using the random-effects model. Heterogeneity among included articles was studied using the  $I^2$  statistic [21] and the maximum-likelihood estimator for  $\tau^2$ .  $I^2$  values of 25%, 50%, and 75% correspond to cutoff points for low, moderate, and high heterogeneity.

## Results

### Studies Selection

Fig. 1 reflects the search and selection flowchart. After the search, 395 articles between both databases were identified. A total of 116 duplicated records were excluded after a

first screening of the titles. Of the remaining articles, 239 were also excluded after reading the abstract. The full text of the 40 remaining publications was read. We attempted contact with 2 authors to obtain some missing data, but no response was provided. In total, 20 articles published between 1990 and 2020 and reporting data on 1386 women undergoing US-guided aspiration of adnexal masses were included [9,22–40].

### Quality Assessment

The qualitative assessment of the researchers included in this review is shown in Table 1. With regard to selection, all articles were considered to represent a selected group of the studied cohort—women with benign adnexal masses undergoing transvaginal US-guided aspiration with or without sclerotherapy. All publications ascertained the exposure (sclerotherapy). In all the articles, the outcome of interest (recurrence rate) was not known at the start of the study.

Regarding the comparability domain, we considered that cohorts were comparable as 15 articles controlled the main confounders.

Finally, with regard to the outcome item, follow-up was considered enough in 9 studies (at least >6 months) and was complete and adequate because they had followed up with all their patients. A correct assessment of the results was considered in the 20 studies included because they all had a record of the recurrences.

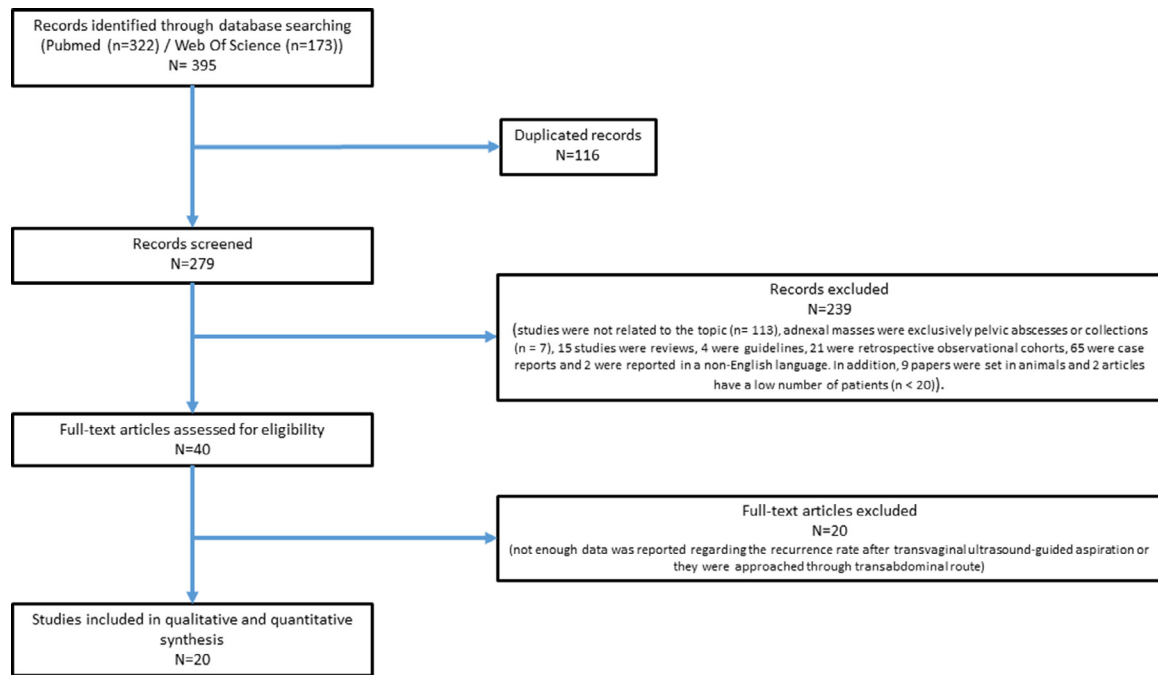
### Characteristics of Studies Included

Of all 20 articles included, 9 were prospective observational studies, 4 were randomized trials, and 7 publications did not specify their type of design. In 12 of the included studies, sclerotherapy was done. Ethyl alcohol was the most frequent sclerosant agent used (8 articles), whereas other types of agents were used in the rest (tetracycline in 3 and lauromacrogol in 1). Four studies did not address their recurrence criteria [24,32,38,40]. Of the remaining 16 articles, 10 set a fixed size by centimeters [9,22,25,26,29,30,36] or by volume [27,28,31] to define recurrence. The other 6 publications, referred to “recurrence” as “reappearance of endometrioma” [23,34], “fluid re-accumulation” [33], “residual cyst” [35], “residual fluid” [37], “recurrent cystic findings in the same place as the initially sonographic findings” [39]. In 5 of the articles, the mean follow-up of the patients was not available. Thus, neither the recurrence definition nor a settled time to diagnose a recurrence was homogeneous among the studies. Table 2 summarizes data from the studies included in this systematic review.

From the included studies, 1386 patients with benign adnexal masses as assessed by US and submitted to the US-guided aspiration with or without sclerotherapy were included in this meta-analysis. In 843 patients, US-guided aspiration

**Fig. 1**

Flowchart showing studies selection process.



and sclerotherapy was done. A total of 543 patients underwent US-guided aspiration without sclerotherapy. The distribution of the masses is shown in Table 3 to denote comparisons in which the distribution differed and describe how such comparisons are made in the Materials and Methods.

### Pooled Recurrence Rate

Using a random-effect model, the overall pooled recurrence rate estimated after drainage was 27% (95% CI, 18%–39%). The percentage of patients who had a recurrence

**Table 1**

Quality assessment of studies included according to the Newcastle-Ottawa Scale

Author	Yr	Selection	Comparability	Outcome	Quality
Ron El et al [39]	1991	++++	+	+	Poor
Bret et al [40]	1992	++++	+	++	Poor
Giorlandino et al [38]	1993	++++	++	++	Good
Weinraub et al [37]	1994	++++	++	++	Good
Chang et al [24]	1997	++++	++	++	Poor
Petrovic et al [36]	2002	++++	++	+	Poor
Fisch and Sher [35]	2004	++++	++	+	Poor
Ikuta et al [34]	2005	++++	++	++	Good
Hammadieh et al [33]	2008	++++	+	++	Good
Yazbeck et al [9]	2009	++++	++	++	Good
Jiang et al [31]	2010	++++	++	+	Poor
Kukura et al [32]	2010	++++	+	++	Good
Kars et al [30]	2012	++++	++	++	Good
Aflatoonian et al [23]	2013	++++	++	++	Good
Nikolaou et al [25]	2014	++++	++	++	Good
Castellarnau et al [26]	2015	++++	++	+++	Good
Wu and Xu [28]	2015	++++	++	+++	Good
García-Tejedor et al [29]	2015	++++	++	+++	Good
Fei et al [27]	2018	++++	++	++	Good
Díaz de la Noval et al [22]	2020	++++	++	+++	Good

**Table 2**

Characteristics of included studies in this systematic review according to PICO criteria

Author	Yr	Design	Type of sample	Sample	Recurrence	Mean follow-up (mo)	Minimum follow-up (mo)	Maximum follow-up (mo)	Losses	Number of controls	Type of lesion	Mean size (mm)	Minimum size (mm)	Maximum size (mm)	Sclerotherapy	Agent	Major morbidity	Mild pain	Cytologic analysis
Ron El et al [39]	1991	P	CR	27	16	NA	NA	6	NA	2	SC	61	27	110	No		NA	NA	Negative
Bret et al [40]	1992	P	NA	36	19	11	2	24	3	NA	M	NA			No		0	1	Negative
Giorlandino et al [38]	1993	P	NA	34	18	12	6	20	0	NA	E	56	21	111	No		0	0	Negative
Weinraub et al [37]	1994	NA	NA	35	19	NA	NA	12	0	4	SC	58	35	120	No		0	0	Negative
Chang et al [24]	1997	P	NA	32	15	NA	NA	12	NA	5	E	NA	16	102	Yes	Tetracycline hydrochloride 1%	2	0	Negative
Petrovic et al [36]	2002	P	NA	72	32	NA	NA	6	NA	2	M	NA	28	115	No		1	0	Positive
Fisch and Sher [35]	2004	P	NA	32	8	1.5	1.5	1.5	NA	NA	E	NA	15	60	Yes	Tetracycline 5%	0	0	Negative
Ikuta et al [34]	2005	R	NA	18	2	16.5	3	36	NA	NA	E	50	31	100	Yes	OH	1	0	Negative
Hammadieh et al [33]	2008	P	NA	26	8	0.5	0.5	0.5	0	2	H	NA			No		0	0	NA
Yazbeck et al [9]	2009	P	NA	31	4	10.2	1.5	26	NA	NA	E	38.6	20	58	Yes	OH	0	1	Negative
Jiang et al [31]	2010	P	CR	52	0	0.5	NA	NA	NA	1	H	NA	19	78	Yes	OH 98%	0	0	NA
Kukura et al [32]	2010	P	NA	366	30	NA	NA	12	NA	3	SC	50 mL	40 mL	300 mL	Yes	OH 95%	0	20	Negative
Kars et al [30] - 1	2012	RCT	NA	48	7	12	12	12	0	12	SC	64.3	50	90	Yes	Tetracycline	NA	NA	Negative
Kars et al [30] - 2	2012	RCT	NA	48	24	12	12	12	0	12	SC	63.5	50	80	No		NA	NA	Negative
Aflatoonian et al [23]	2013	P	NA	20	4	6	6	6	0	5	E	414.5			Yes	OH	0	0	Negative
Nikolaou et al [25]	2014	P	NA	46	18	6	6	6	0	3	M	NA	30	80	No		0	8	Negative
Castellarnau et al [26] - 1	2015	P	NA	63	45	26.5	6	78	0	NA	SC	55.5	19	120	No		0	0	Negative
Castellarnau et al [26] - 2	2015	P	NA	75	17	20.3	6	41	0	NA	SC	30.6	13	49	Yes	OH	0	18	Negative
Wu and Xu [28]	2015	RCT	NA	34	12	12	12	12	0	3	E	49.3	40	80	Yes	OH	0	13	Negative
García-Tejedor et al [29]	2015	P	NA	25	3	17	NA	36	0	4	E	65.8	41	94	Yes	OH	0	3	Negative
Fei et al [27]	2018	P	NA	110	8	NA	NA	6	0	3	E	51	41	95	Yes	Laurocrogol	0	2	NA
Díaz de la Noval et al [22]	2020	P	NA	156	102	18.5	11.4	35.6	2	2	M	66			No		3	0	Negative

CR = consecutive recruitment; E = endometrioma; H = hydrosalpinx; M = mixture of lesions; NA = not addressed; OH = ethyl alcohol; P = prospective observational; PICO = participants, interventions, comparisons, outcomes, and study design; R = retrospective observational; RCT = randomized control trial; SC = simple cyst.



**Table 3**

Distribution of the masses according to sclerotherapy or nonsclerotherapy group

Type of mass	Sclerotherapy	No sclerotherapy	Total
Simple/serous cyst	489 (59.6)	331 (40.4)	820
Endometrioma	302 (85.8)	50 (14.2)	352
Hydrosalpinx	52 (66.7)	26 (33.3)	78
Functional cyst	0 (0)	100 (100)	100
Other*	0 (0)	36 (100)	36
Total	843	543	1386

Values are given in number (%).

\* Dermoid cyst (n = 4), hemorrhagic cyst (n = 3), abscess (n = 11), paraovarian cyst (n = 1), peritoneal cyst (n = 1), not stated (n = 16).

after aspiration alone was 53% (95% CI, 46%–60%). This figure was 14% (95% CI, 8%–22%) when sclerotherapy was applied. There was a high heterogeneity of the included studies ( $I^2$ , 92%; 95% CI, 89%–94%),  $\tau^2$  was 1.40 ( $p < .01$ ) (Fig. 2). We observed a significant difference in the recurrence rate depending on applying sclerotherapy ( $p < .0001$ ). The mean follow-up of studies included was 11.4 months, and the median was 12 months (range 0.5–26.5 months).

### Morbidity Associated

A secondary analysis was performed to determine the morbidity associated with US-guided transvaginal aspiration of benign adnexal masses. Of the studies included in the review, 2 did not address if they had complications. Therefore, data from 18 studies (1297 patients) were available. In 6 articles, none of the patients suffered any complication associated with the technique. A total of 4 studies reported major complications, and 8 reported minor complications. In total, 6.9% (90 of 1297) of patients suffered a complication owing to the procedure.

Regarding minor complications, the most frequent was mild pelvic pain: 72 (5.4%) patients, 8 (11.1%) in the group of no sclerotherapy, and 64 (88.8%) in the sclerotherapy group. Mild pain was significantly more frequent in the sclerotherapy group ( $p < .01$ ). Other minor complications were 2 extravasations (both when ethyl alcohol was used as sclerosant), 3 ruptured cysts, 1 alcohol flush reaction, and 2 gastrointestinal discomfort.

A major complication was reported in 10 cases (0.7%). These were 5 cases of infection (3 abscesses, 1 infection, and 1 postoperative fever), 4 of which occurred in the nonsclerotherapy group, 2 cases of pelvic adhesions after extravasation of tetracycline (observed in posterior laparoscopy owing to recurrence of adnexal cyst), and 3 alcohol intoxications. Differences in major complications between sclerotherapy and nonsclerotherapy were not statistically significant (0.7% and 0.9%, respectively;  $p > .05$ ).

Although it was not one of the purposes of this study, the cytologic analyses of the content of the cysts were recorded in the participants, interventions, comparisons, outcomes, and study design table (Table 3). However, in 16 articles, the cytologic analysis was negative for malignancy in all cases ( $n = 1160$ ). 3 publications did not specify if they had done a cytologic analysis. Malignant cells were identified in only 1 patient, who had a previous history of ovarian cancer.

## Discussion

### Summary of Evidence

The overall pooled rate of recurrence of adnexal masses was 27%. It was significantly lower when using sclerotherapy (14% vs 52.3%). The most frequent complication was mild pelvic pain. The rate of major complications was low in both techniques.

### Interpretation of Results

The recurrence of adnexal masses treated with US-guided aspiration was lower when sclerotherapy was applied. Thus, it seems favorable to add a sclerosant agent when US-guided aspiration is being considered in the treatment of a symptomatic and benign adnexal mass. Aspiration alone should probably not be offered because of its high recurrence rate.

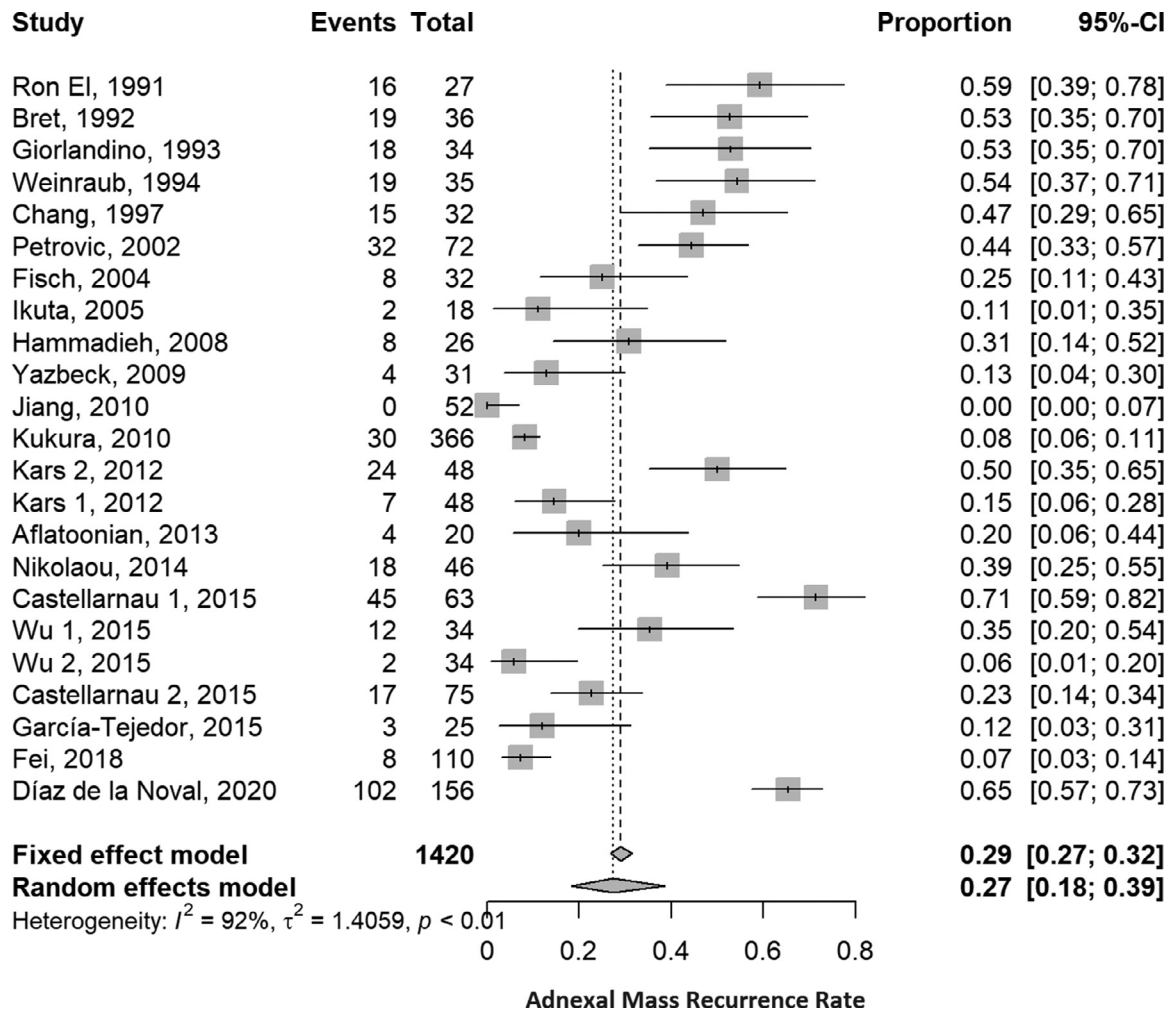
### Limits and Strengths

The main limitation of this meta-analysis was the great heterogeneity of the included studies. Design of the articles addressed in this review could have been another limitation. Even though we included the best evidence available, as randomized controlled trials and cohort studies, most of the randomized controlled trials did not allocate sclerotherapy vs aspiration alone. Instead, studies by Aflatoonian et al [23] and Hammadih et al [33] had control groups receiving no aspiration.

Indications for aspiration therapy alone or with sclerotherapy remain unclear owing to the absence of head-to-head trials comparing aspiration therapy with surgical management. We did not perform a comparison between ovarian cyst aspiration and laparoscopic ovarian cystectomy. However, data from literature has reported a recurrence rate of ovarian cysts after laparoscopic cystectomy ranging from 0% to 60% [41–44]. Despite this, the mean follow-up was longer in these studies compared with articles that evaluated aspiration alone or with sclerotherapy—these differences made it difficult to assess real differences between the recurrence rates of adnexal masses with laparoscopic cystectomy and those with US-guided aspiration. In relation to this point, it must be emphasized that cytologic analysis

**Fig. 2**

Forest plot showing the rate of recurrence according to the use of sclerotherapy. CI, confidence interval.



after puncture and aspiration has lower diagnostic value than definitive histologic analysis after cyst removal.

It appears from this study that if aspiration is considered, it would be prudent to offer together with sclerotherapy. Regarding sclerotherapy, there were not homogeneous protocols among the studies [9–13]. Another potential limitation was that a subgroup analysis of potentially interesting variables that may affect the recurrence rate has not been done. For example, could the size of the adnexal mass treated affect the recurrence rate? Moreover, the success of sclerotherapy for the various types of adnexal lesions in the study is likely variable, and estimates for particular types of lesions are hard to obtain from this study of aggregated outcomes. The current meta-analysis cannot answer these clinical questions.

By contrast, the definition of an effective procedure is not homogeneous. The definition of recurrence varied among the studies, setting a recurrence in a range of 1 to 4 cm [9,22,25,26,29,36] or even describing a recurrence as a refilled cyst of >50% of the original volume [28] or

>10% [31]. In addition, the follow-up and the planned surveillance varied among the studies [9,22]. A common definition would be desirable. Achieving a consensus on this point would lead to improve available data. We propose to set the reappearance of a  $\geq 3$ -cm cyst in premenopausal patients and  $\geq 1$ -cm cyst in postmenopausal patients to define a recurrence to use a common definition across future studies [16,36]. Furthermore, we did observe that some studies defined success as just a volume reduction but not complete aspiration of fluid content. We wonder whether this is a correct definition of “success.”

Finally, another potential limitation was that there was an unbalanced distribution of some type of lesions between both groups of treatment (sclerotherapy vs no sclerotherapy). Most endometriomas were treated by sclerotherapy, and all functional cysts were treated by simple aspiration and drainage. The type of lesion could have been a significant confounder factor, and we could not perform a meta-analysis on the basis of individual data.

The main strength of this study was that, as far as we know, this is the first meta-analysis reported addressing this issue. The results were based on data from 1386 patients, which can be considered a good sample size.

## Conclusions

US-guided aspiration with sclerotherapy had a lower recurrence rate than US-guided aspiration without sclerotherapy. The results suggest that US-guided transvaginal aspiration with sclerotherapy could be a treatment option in patients with symptomatic benign adnexal masses with an acceptable recurrence rate—pooled recurrence rate of 14%—and it is likely a better choice than aspiration alone.

However, these results should be interpreted with caution given the heterogeneity of the studies as well as the absence of studies comparing both approaches (aspiration plus sclerotherapy vs aspiration only). Randomized trials with standardized protocols should be done to improve the evidence of the efficiency of this technique.

By contrast, regarding the adoption of this procedure in routine clinical practice, we think that aspiration should be considered an experimental procedure as there are few studies addressing long-term recurrence rate, and data comparing this technique with surgical cystectomy are lacking.

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