



Incidence of seroma in abdominoplasty with versus without the use of drains and quilting sutures: a systematic review and meta-analysis

Incidência de seroma em abdominoplastia com e sem uso de drenos e pontos de adesão: revisão sistemática e metanálise

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■ ABSTRACT

Introduction: Abdominoplasty, which aims to improve body contour, has been upgraded by its association with limited dissection of the cutaneous flap and quilting sutures in the same surgery to avoid the formation of post-abdominoplasty seroma, a complication that troubles both patient and surgeon. Therefore, this study aimed to assess whether the use of quilting sutures is associated with a lower incidence of seroma after abdominoplasty than the use of drains. **Methods:** A systematic review of the literature and a meta-analysis were performed of the Science Direct, Scielo, Pubmed, Lilacs, CINAHL, and Scopus databases. The data analysis was performed using the Stata 12.0 program and the I² statistic proposed by Higgins, with a 95% confidence interval for the relative risk for seroma by intervention type (drain, quilting sutures, drain with quilting sutures). The study was registered in PROSPERO (CRD42019120399). **Results:** Five studies met the inclusion criteria and were included in the meta-analysis. Quilting sutures showed a protective effect (versus use of drain with quilting sutures) in the prevention of seroma (relative risk, 0.13; 95% confidence interval, 0.02–0.66). **Conclusion:** These findings suggest that the use of quilting sutures instead of drains in abdominoplasty can effectively prevent seroma formation.

Keywords: Abdominoplasty; Drain; Suction; Seroma; Plastic Surgery; Meta-analysis.

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■ RESUMO

Introdução: A abdominoplastia é um procedimento para a melhoria do contorno corporal e a técnica tem sido aprimorada pela associação da dissecação limitada do retalho cutâneo e pontos de adesão no mesmo ato operatório, evitando-se a formação de seroma pós-abdominoplastia, complicação que incomoda tanto o paciente quanto o cirurgião. Portanto, o objetivo é avaliar se o uso de pontos de adesão está associado a menor incidência de seroma após abdominoplastia quando comparado ao uso de drenos. **Métodos:** Revisão sistemática da literatura com metanálise, envolvendo as seguintes bases de dados: Science Direct, Scielo, Pubmed, Lilacs, CINAHL e Scopus. Para analisar os dados foi utilizado o programa Stata 12.0 e a estatística I^2 proposta por Higgins, com intervalo de confiança de 95% para o risco relativo para seroma, segundo o tipo de intervenção (dreno, ponto de adesão, dreno com ponto de adesão). Sendo registrado no PROSPERO sob o número CRD42019120399. **Resultados:** Cinco estudos preencheram os critérios de inclusão e foram incluídos na metanálise. Ao comparar o uso de dreno de sucção com pontos de adesão, os pontos de adesão mostraram um fator de proteção na prevenção do seroma (RR: 0,13; IC 95%: 0,02-0,66). **Conclusão:** Os achados sugerem que o uso de pontos de adesão em abdominoplastia em detrimento do uso de drenos pode ser uma técnica eficaz para prevenção da formação de seromas.

Descritores: Abdominoplastia; Drenagem; Sucção; Seroma; Cirurgia plástica; Metanálise.

INTRODUCTION

Abdominoplasty is a specific and effective procedure used to improve body contour¹. Various improvements in the technique have been achieved by the combination of limited dissection of the cutaneous flap and quilting sutures in the same surgery, thus avoiding suture dehiscence and complications such as skin necrosis, hematoma, and seroma¹. Postoperative abdominoplasty seroma is a rather high-prevalence complication (10–15%) that troubles both patient and plastic surgeon².

Seroma occurs mainly in patients with a high body mass index, those who experienced significant weight loss, and in cases of prior supraumbilical incisions³. Another contributing factor is large abdominal flap detachment, which creates a greater detached area for liquid collection that greatly devascularizes the flap and causes greater lymphatic vessel damage⁴; this is reflected in the presence of dead space between the abdominal muscle aponeurosis and the dermal fat flap postoperatively⁵.

The use of active drains is known to prevent the occurrence of seroma⁴. One of the solutions proposed in the literature was widely described in the work of Baroudi and Ferreira in 1998⁶, which is based on the

use of quilting sutures and reduction of dead space between dissected tissues, culminating in the complete abolition of the use of drains and absence of seroma in their sample of 130 patients⁶.

An analysis of the literature indicated a lack of consensus on the indication for use of quilting sutures. A predominance of reports discuss another relevant surgical technique, progressive tension sutures, which led us to develop this work. Thus, this study aimed to evaluate whether the use of quilting sutures versus drains is associated with a lower incidence of seroma after abdominoplasty.

METHODS

This systematic review of the literature with a meta-analysis questioned whether there is a difference in the incidence of seroma in abdominoplasty with the use of drains versus quilting sutures. To identify relevant studies, the following databases were queried: Science Direct, Scopus, PubMed (medical Publications), LILACS (*Literatura Científica e Técnica da América Latina e Caribe*), Scielo (Scientific Electronic Library Online), and CINAHL (Cumulative Index to Nursing and Allied Health Literature).

There were no restrictions on language or

publication date, with all publications published until 25 May 2018. The search strategy performed in PubMed included the terms “abdominoplasty” [MeSH terms] OR “abdominoplasty” [All Fields] AND “drains” [All Fields]. Equivalent search strategies were adopted for the other databases. To identify additional studies, the references of the articles included were manually checked and relevant publications on the subject were evaluated.

Among the articles that were identified through the search strategy, those that adequately met the following inclusion criteria were selected: abdominoplasty comparing the use of drains and/or quilting sutures with their respective seroma rates encompassing both sexes. The exclusion criteria were: review articles, encyclopedias, book chapters, case studies, or commentaries; and the use of surgical techniques that differ from quilting sutures, for example, progressive tension sutures. These features were registered in a protocol in the International Prospective Register of Systematic Reviews (PROSPERO; no. CRD42019120399).

Two independent researchers assessed the titles and abstracts of the obtained articles and identified all potentially eligible publications for full-text review. The data extraction and final classification for inclusion in the review were performed independently. The results were compared, and consensus was reached through discussion as needed.

The main information collected from each article was entered into a spreadsheet and included the following: author and publication year, study type, sample size, age range of study population, patient sex, year study was performed, intervention country, intervention type (drain only, quilting sutures, drain

with quilting sutures), follow-up time, results, and recommendations/conclusions.

After collecting the information, the authors analyzed the methodological quality using the instrument “Appropriate Use and Reporting of Uncontrolled Case Series in the Medical Literature”⁷ since all studies that met the inclusion criteria were cases series. This scale has seven items (Table 1): 1. Explicitly state the hypothesis/hypotheses under consideration; 2. Explicitly provide eligibility criteria for subjects in the report; 3. Precisely describe how treatments were administered or potential risk factors defined; 4. Compare observed results to those in an appropriate external comparison group and discuss potential biases arising from such comparison; 5. Perform appropriate statistics, ensuring that assumptions of the statistical methods are reasonable in this setting; 6. Discuss the biological plausibility of the hypothesis in light of the report’s observations; 7. Explicitly discuss the report’s limitations and how these limitations could be overcome in future studies.

The data were analyzed using the Stata 12.0 program (StataCorp LP, College Station, TX, USA). To measure inconsistencies between studies (percentage of total variation between studies due to heterogeneity), the I^2 statistic proposed by Higgins (REF) was used with a 95% confidence interval (CI) of the relative risk (RR) for seroma according to intervention type (drain, quilting sutures, drain with quilting sutures). As the number of studies was small and had little heterogeneity, there was no need for a further analysis.

Table 1. Scale of methodological quality “Appropriate Use and Reporting of Uncontrolled Case Series in the Medical Literature” used to evaluate the included studies.

	Arantes et. al. (2009)	Soncini; Baroudi (2016)	Oliveira et. al.(2008)	Sforza et. al.(2015)	Trufino et. al.(2015)
Explicitly state the hypothesis	+	+	+	+	+
Eligibility criteria	+	+	+	+	+
Treatments administered/ potential risk factors	?	-	+	+	+
Comparison with external group/ discussion of potential biases	+	-	+	+	+
Statistical tests and limitations	+	-	+	+	-
Concordance with the existing literature	+	+	+	+	+
Discussion of limitations	-	-	-	+	+

+Item present in the study; -Item missing; ?Lack of information in the study.

RESULTS

Altogether, 437 articles were identified as potentially eligible for inclusion in this review. After the exclusion of duplicate articles (n = 57), the titles and abstracts of 380 articles were reviewed. Subsequently, 30 articles remained. Of them, 25 did not meet the inclusion criteria and were subsequently excluded (Figure 1).

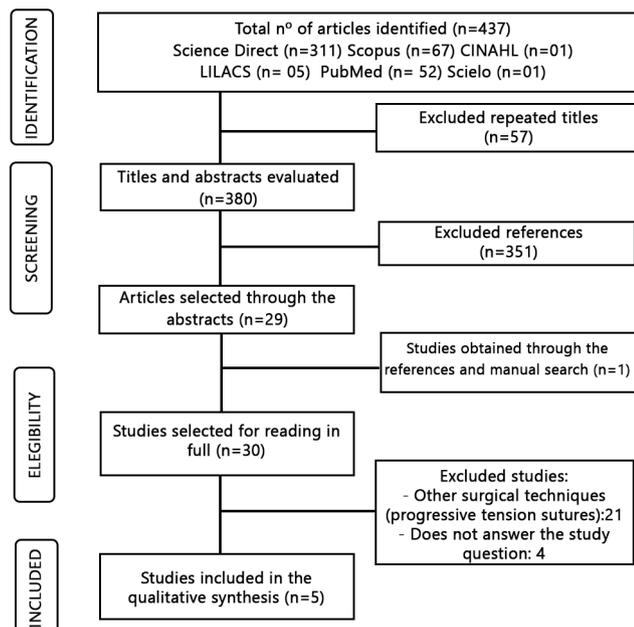


Figure 1. Flowchart of the article selection process of studies of abdominoplasties comparing the use of drains and/or quilting sutures

Only descriptive case series were identified for inclusion in the systematic review; during the assessment of methodological quality, the article by Soncini and Baroudi (2016)¹ met the fewest criteria, while that by Sforza et al. (2015)⁸ met the most criteria. The discussion of limitations was most often lacking, while all articles met the following criteria: clearly describe the hypothesis, specify eligibility criteria, and state agreement with the existing literature (Table 1).

Of the included studies, the sample size ranged from 34 to 500 patients aged 23–75 years, there was a

predominance of female patients, and the follow-up was 7–360 days (Table 2). Regardless of intervention type and follow-up period, four studies showed a lower rate of seroma formation using quilting sutures than suction drains. In addition, in all studies, the same surgical team provided the interventions. Table 3 describes the data of the five studies with their respective results and recommendations/conclusions.

Due to the lack of any important diversity and heterogeneity, the fixed effects method was used in all analyses, which assumes that all studies showed the same effect. The studies that assessed the rate of postoperative seroma with the use of quilting sutures versus drains indicate lower rates of seroma in the group that used quilting sutures only; thus, it is considered a protective factor (RR, 0.13; 95% CI, 0.02–0.66) (Figure 2A).

When comparing the groups that use only quilting sutures *versus* quilting sutures + drain, a protection against the formation of seroma was observed in the group that used only quilting sutures (RR, 0.66; 95% CI, 0.45–0.97), as shown in Figure 2B. When comparing the groups that used only drain *versus* quilting sutures + drain the group that used quilting sutures + drain displayed a lower rate of formation of seroma (RR, 0.06; 95% CI, 0.01–0.29) (Figure 2C).

DISCUSSION

According to the results obtained for each article analyzed in this study, the use of quilting sutures was significantly better in protecting against seroma when compared to techniques using drain alone or drain associated with the quilting sutures.

Suction drains were believed to improve the approximation of bloody areas by better surface apposition and reduce fluid accumulation, but their disadvantages have been widely documented, such as ineffectiveness, discomfort, mobilization difficulty, rupture or premature extrusion, bacterial colonization, tissue irritation, and increased seroma formation⁹.

To mitigate these disadvantages, quilting sutures have been used since they reduce flap mobility and

Table 2. Characteristics of studies in the meta-analysis that show an association between seroma and use of drain or quilting sutures.

Article	N	Age	Year of surgery	Follow-up time (days)	Sex	Seroma (%)		
						D	QS	D + QS
Arantes HL et al. ²	60		2006-2007	7-14-30-60-120-180	F, 60 M=0	3.45	3.2	
Soncini JA et al. ¹	500	24-75	2007-2014	-	F, 490 M= 10	15.6	23.7	
Oliveira EA et al. ⁴	58	29-73	1999-2003	-	F, 56 M= 2	28	3.33	0
Sforza M et al. ⁸	326	28-57	2007-2011	7-14-28-360	F, 326 M= 0	12		0
Trufino AJ ⁵	34	23-67	2008-2012	7-14-21-30-45-60-90-180-360	F, 34 M=0	17.6	0	

D, drain; F, female; M, male; N, sample size; QS, quilting sutures

Table 3. Main results and recommendations/conclusions of the studies included in the meta-analysis.

Author/Year	Sample	Results	Recommendations /Conclusions
Arantes HL et al. ²	60	Drain (n = 29) and drain and quilting sutures (n = 31) were used. Seroma formation rate were 3.45% in the first group and 3.2% in the second group.	Quilting sutures were considered effective for preventing seroma formation, even without statistical significance between the groups.
Soncini JA et al. ¹	500	Drain (n = 192) and drain and quilting sutures (n = 308) were used. Seroma formation rates were 15.6% in the first group and 23.7% in the second group.	Quilting sutures were efficient in preventing seroma. The use of aspiration drain did not diminish the incidence of seroma formation.
Oliveira EA et al. ⁴	58	Drain (n = 25) and drain and quilting sutures (n = 30) were used.	Adhesion points inhibited the formation of seroma with statistical significance (p <0.05).
Sforza M et al. ⁸	326	Drain (n = 100) and drain and quilting sutures (n = 226) were used. The seroma formation rates were 12% in the first group and 0% in the second group.	There was no difference between the use of quilting sutures or drains.
Trufino AJ ⁵	34	Drain (n = 17) and drain and quilting sutures (n = 17) were used. The seroma formation rates were 17.64% in the first group and 0% in the second group.	The quilting sutures showed advantages reduction of the complications compared to the control group.

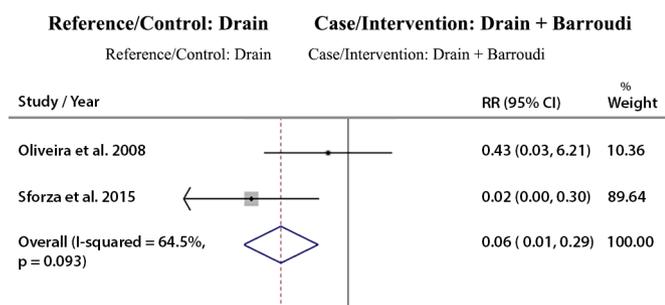
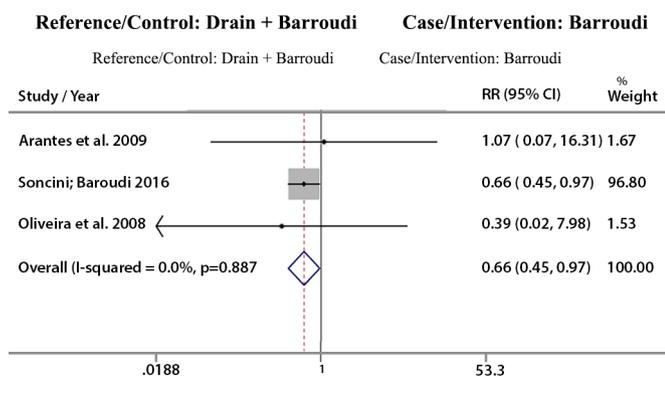
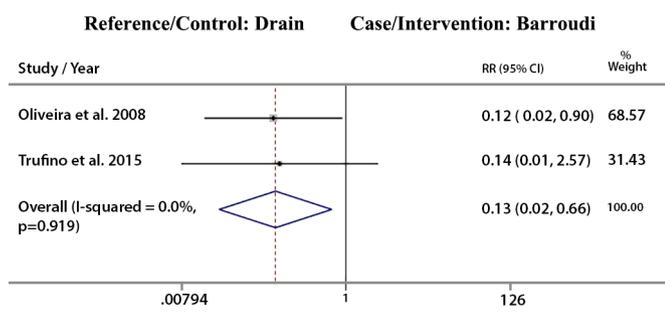


Figure 2. Combined analysis of the relative risk of seroma formation according to the use of drains or quilting sutures.

thus the shear forces between the aponeurosis and the flap, facilitating healing. Another characteristic that corroborates the decrease in seroma formation is the reduction of dead space³.

Furthermore, the hospitalization stay of patients undergoing abdominoplasty, previously determined by the volume of effluent collected in suction drains, was abbreviated with the use of quilting sutures to a mean 24 hours, allowing an earlier return to usual activities¹⁰.

Despite the technical peculiarities inherent to each surgeon, all authors followed the principle of the quilting sutures technique described by Baroudi and Ferreira (1996 and 1998, respectively)⁶, which basically consists of isolated quilting sutures that secure the cutaneous flap on the aponeurosis of the rectus abdominis muscle spaced 4 cm apart between sutures in rows and columns from the xiphoidal appendix to the pubic region bilaterally using absorbable wires¹.

The learning curve for quilting suture placement is short, so the execution time is not significantly higher than that of other surgical techniques; thus, no increase in the risk of complications is implied. As in the treatment of seroma, several punctures are usually required, and use of this technique prevents postoperative disorders³.

Despite the comprehensive literature review, this meta-analysis has some limitations, such as the lack of data on participants' BMI and the non-description of randomization in all studies (which may have interfered with the study outcome since people at higher risk of seroma development may have been treated with drains and different associated techniques such as the use of abdominal liposuction).

Nevertheless, the work of Oliveira et al. in 2008⁴ indicated that upper abdominal liposuction associated

with limited flap dissection did not increase the rate of complications. Another relevant point is the lack of standardization regarding the criteria for drain removal; early withdrawal of the drain could increase the incidence of seroma formation.

CONCLUSION

Although studies involved in the literature review did not use patient randomization, which would provide greater scientific evidence, these results suggest that the use of quilting sutures alone is superior to the use of drains or the use of drains with quilting sutures. We also recommend that researchers perform randomized clinical trials to aid in the decision-making process for surgical procedures based on a high level of evidence.

COLLABORATIONS

- KGM** Analysis and/or data interpretation, Conception and design study, Data Curation, Final manuscript approval, Formal Analysis, Methodology, Writing - Original Draft Preparation, Writing - Review & Editing
- CFR** Analysis and/or data interpretation, Data Curation, Final manuscript approval, Formal Analysis, Writing - Original Draft Preparation, Writing - Review & Editing
- FGC** Final manuscript approval, Supervision, Writing - Original Draft Preparation, Writing - Review & Editing

KGM Analysis and/or data interpretation, Final manuscript approval, Formal Analysis, Methodology, Supervision, Writing - Original Draft Preparation, Writing - Review & Editing

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