

Decreasing Seroma Incidence following Abdominoplasty: A Systematic Review and Meta-Analysis of High Quality Evidence

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Introduction

Seroma formation is the most common complication of abdominations, with incidence rates of up to 25% have been reported.

Though typically benign and self-limited, untreated seromas can further exacerbate poor outcomes, leading to wound dehiscence, flap necrosis, infection, and pseudocyst formation.

Many interventions have been proposed to help prevent seroma formation following abdominoplastics, but there is sparse literature comparing the performance of these interventions with one another to determine the most effective technique

Objective

The objectives of the current review are to qualitatively and quantitatively analyze methods backed by high-level evidence to prevent seroma formation after abdominoplasty.

Methods

The PubMed® database was queried on June 16, 2021. The primary articles of interest were those with high-quality study designs such as randomized controlled trials, prospective comparative studies, and meta-analyses of these study designs. The level of evidence (LOE) for each article was determined according to the American Society of Plastic Surgeons (ASPS) Levels of Evidence Rating Scale for Prognostic/Risk Studies.

Results

Data on seroma prevention technique was pooled from 20 articles, vielding 1,205 patients and 9 categories of seroma prevention techniques. Study designs included randomized controlled trials (n = 10), prospective cohort studies (n = 2), prospective comparative studies (n = 7). and retrospective randomized studies (n = 1). The average LOE was 1.1 ± 0.3 .

	Alternative Technique	Standard Drains	p-valu
Number of Patients	203	113	n/a
Age (years)	40 ± 5	41 ± 7	0.5587
BMI (kg/m^2)	25.64 ± 2.19	25.55 ± 1.96	0.761
esected Weight (g)	764.9 ± 353.7	764.8 ± 277.0	0.9982
% Smoking	15% (17/113)	13% (12/90)	0.7293
% Eomalo	96% (108/113)	93% (84/90)	0.4933

Patients demonstrated Patients were assessed for seroma formation either difference between clinically (n = 7), with ultrasound (n = 3), or both (n =intervention group 6); four studies did not specify



no significant

control and



The use of PTS and OS had the greatest amount of data supporting a statistically significant reduction in seroma, with four of five studies clearly demonstrating a beneficial effect on seroma reduction compared to their respective control groups. The seroma occurrence ratio was 0.306 (p < .001), further confirming the efficacy in PTS and QS in decreasing seroma formation after abdominoplasties.

Studies examining the efficacy of tissue adhesives revealed mixed results with regards to seroma reduction; seroma occurrence ratio of tissue adhesives compared to their respective control group was 0.375 (p < .01), revealing a significantly lower rate of seroma events when quantitatively analyzed.

Similarly, preservation of Scarpa's fascia during surgical dissectio demonstrated equivocal results; seroma occurrence ratio for this technique was 0.229 (p < .001), indicating a statistically significant reduction in post-operative seroma with Scarpa's fascia preservation.

Technique/Intervention	Number of Studies	Number of Involved Patients	Demonstrated Clear Benefit?	Qualitative Recommendation	Statistical Significance
Tissue Adhesives*	7	101	Yes (3); No (4)	Mixed	Yes
PTS and QS	5	99	Yes (4); No (1)	Yes	Yes
Preservation of Scarpa's Fascia	3	126	Yes (2); No (1)	Mixed	Yes
Electrocautery (vs. Scalpel)	2	138	Yes (0); No (2)	No	Equivocal
Plasma Coagulator vs. Conventional Electrocautery	2	57	Yes (1); No (1)	Mixed	Insufficient Data
Triamcinolone	1	20	Yes (1); No (0)	Yes	Insufficient Data
3 Drains (vs. 2)	1	40	Yes (0); No (1)	No	Equivocal
Lipoabdominoplasty	1	20	Yes (1); No (0)	Yes	Insufficient Data
Continuous Negative Pressure Drain	1	29	Yes (1); No (0)	Yes	Equivocal

Summary of Recommendations

Equivocal to Alternative Technique

Insufficient sample size

Of the three interventions examined in the meta-analysis, PTS/OS was the only sub-group to reveal statistically significant efficacy in reducing seroma formation, but the overall pooled analysis also demonstrated a risk ratio of 0.30 (95% CI [0.13, 0.71], I2 = 33%) compared to the standard approach of placing two closed-suction drains

Study or Subaroup	Alternative Tech Events	nnique Total	Standard E Events	Drains Total	Weight	Risk Ratio M-H. Random, 95% CI	Risk Ratio M-H. Random, 95% CI
1.1.1 Quilting Sutures							
Andrades et al. 2007	4	15	5	10	32.4%	0.53 [0.19, 1.51]	
Bromley et al. 2018	2	21	16	21	24.6%	0.13 [0.03, 0.48]	
Di Martino et al. 2010 (1)	0	17	5	21	7.9%	0.11 [0.01, 1.88]	
Subtotal (95% CI)		53		52	64.9%	0.24 [0.07, 0.82]	-
Total events	6		26				
Heterogeneity: Tau ² = 0.53;	; Chi ² = 3.78, df =	2 (P = 0	$(15); ^2 = 4$	7%			
Test for overall effect: Z = 2	2.29 (P = 0.02)						
1.1.2 Lipoabdominoplasty							
Di Martino et al. 2010 (2)	0	20	5	21	7.9%	0.10 [0.01, 1.62]	
Subtotal (95% CI)		20		21	7.9%	0.10 [0.01, 1.62]	
Total events	0		5				
Heterogeneity: Not applicab	ole						
Test for overall effect: Z = 1	1.63 (P = 0.10)						
1.1.3 Three Suction Drains							
Pisco et al. 2019	4	40	5	33	27.2%	0.66 [0.19, 2.26]	
Subtotal (95% CI)		40		33	27.2%	0.66 [0.19, 2.26]	-
Total events	4		5				
Heterogeneity: Not applicab	ole						
Test for overall effect: Z = 0	0.66 (P = 0.51)						
Total (95% CI)		113		106	100.0%	0.30 [0.13, 0.71]	•
Total events	10		36				
Heterogeneity: Tau ² - 0.30	: Chi ² - 5.97, df -	4 (P = 0	.20); I ² = 3	3%			
Test for overall effect: Z = 2	2.73 (P = 0.006)						Eavorr Alternative Eavorr Standard Draine
Test for subgroup difference	es: Chi ² = 2.18, d	f = 2 (P =	0.34), 12 =	8.2%			navora Procimación Pavors Standard Drains

Conclusions

Among the interventions examined in this systematic review, PTS and OS demonstrated the most reliable data supporting efficacy in reducing seroma formation rate. Studies examining their efficacy were more numerous and consistently provided data supporting their ability to further reduce seroma when applied in conjunction with drains. Subgroup meta-analysis further reinforced this finding, demonstrating a significant reduction in seroma risk.

Other potentially beneficial techniques such as triamcinolone injections, adjunctive liposuction, continuous negative pressure drains, and the use of plasma coagulators (vs. conventional electrocautery) warrant further discussion and research in order to arrive at a more definitive consensus

References

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Conventional Electrocauter

Technique	Seroma Rate in Intervention Group	Seroma Rate in Control Group	Seroma Occurrence Ratio	p-value
PTS and QS	14/99	31/67	0.39	< .00001
servation of Scarpa's Fascia	5/126	22/126	0.23	< .001
Tissue Adhesive	11/101	27/93	0.37	< .001
ntinuous Negative Pressure Drain	1/29	6/29	0.16	0.1069
lectrocautery (vs. Scalpel)	25/169	10/112	1.67	0.1467
3 Drains (vs. 2)	4/40	5/33	0.66	0.7576
Lipoabdominoplasty	0/20	5/21	Insufficient	sample size
Plasma Coagulator vs				