

Cases Report on the Use of Tranexamic Acid to Reduce Perioperative Bleeding in Liposuction and Abdominoplasty

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Abstract

Objective: To evaluate the effectiveness of tranexamic acid in reducing perioperative bleeding in liposuction and abdominoplasty.

Introduction: Liposuction and tummy tuck are two of the most performed cosmetic surgeries in the world. One of the most frequent complications of these procedures is perioperative bleeding, which can lead to inappropriate postoperative procedures with greater complications. For this reason, new methods must be sought to reduce blood loss in this type of surgery.

Materials and methods: A retrospective study was proposed consisting of a case series report in which a group of patients are mentioned to whom 1 gram of tranexamic acid was applied prior to performing liposuction and abdominoplasty. In these patients, a pre-surgical and a post-surgical hemogram was reviewed and the decrease in hemoglobin and hematocrit was compared. Likewise, it was reviewed if the patients presented the need for transfusion of blood components.

Results: A population of 37 female patients was obtained. None of the patients presented a postsurgical hemoglobin less than 8 g / dl or required transfusion of blood products after surgery. A Spearman correlation was performed between the variables, in which there was no evidence of an association between the lipoaspirate and the postoperative hemoglobin or hematocrit.

Conclusion: Tranexamic acid is a drug that may be useful to reduce perioperative bleeding in liposuction and abdominoplasty, since none of the patients who received this drug required transfusion of blood products.

Key words: Tranexamic acid; liposuction; abdominoplasty; hemorrhage

Introduction

Liposuction and abdominoplasty are two of the most performed cosmetic procedures in Colombia and worldwide. The International Society for Aesthetic Plastic Surgery (ISAPS) estimates that in 2018 1,732,620 liposuctions and 888,712 tummy tucks were performed in the world [1]. Beyond that, in Colombia 273,316 cosmetic surgical procedures were performed, of which 17.1% corresponded to liposuction and 8.5% corresponded to abdominoplasty [1].

One of the main complications of these cosmetic procedures is bleeding, which if not controlled can lead to inappropriate postoperative procedures or even death (2). Regarding the pathophysiology of bleeding during this type of surgical procedure, it is known that when performing liposuction with suction cannulas, blood vessels and adjacent tissue are injured, which causes bleeding [2]. Samdal et al propose 3 ways by which the blood that was extravasated due to the damage to the tissues and blood vessels is lost: An external loss in the lipoaspirate, an internal loss due to the formation of dead space when removing fat and blood that It is found in instruments used in surgery such as gauze or compresses [3].

Over the years, new methods have been sought to reduce blood loss since liposuction is one of the most performed cosmetic surgeries and perioperative bleeding is one of its main complications. For this reason, in 1985 the dermatologist Jeffrey Klein developed the tumescent liposuction technique in which adipose tissue is infiltrated with a solution composed of lidocaine, epinephrine and large amounts of saline solution (called Klein's solution) [4]. Later it was shown that this technique reduced the amount of bleeding compared to other techniques, such as dry liposuction [4].

Likewise, over the years, new possibilities have emerged that contribute even more to reducing postoperative bleeding such as tranexamic acid. This drug is an antifibrinolytic agent that inhibits the conversion of plasminogen to plasmin, which prevents fibrin degradation and preserves the clot structure [5]. Due to this mechanism of action, tranexamic acid could be

useful to reduce bleeding, since it would act in conjunction with Klein's solution to reduce blood extravasation.

When reviewing the literature on the use of tranexamic acid in plastic surgery (Medline and Scielo), the evidence is scarce and the articles that were found expose the benefits of this drug in the management of burns, maxillofacial surgery and otorhinolaryngology.

For this reason, it was decided to carry out a descriptive study with the objective of evaluating postoperative bleeding and the need for transfusion in patients who received tranexamic acid during liposuction and abdominoplasty.

Materials and methods

A retrospective case series report was carried out with the objective of evaluating the effectiveness of tranexamic acid in reducing perioperative bleeding in female patients who underwent abdominoplasty plus liposuction.

Population

For the case report, they reviewed the medical records of the patients who underwent surgery at the "Santa Barbara Surgical Center" clinic in the city of Bogotá between 01/15/2020 until 03/15/2020. For the study, those patients who underwent abdominoplasty plus body liposuction were included. Patients who underwent an additional procedure were excluded from the study.

Table 1: Eligibility criteria.excel

Inclusion criteria	Exclusion criteria
Surgery performed: Abdominoplasty + Liposuction	Hypersensitivity to tranexamic acid
Age: 18 - 65	Presence of coagulation diseases
Tranexamic acid application	Abdominoplasty + Liposuction + Other procedure
ASA I or II patients	Male

By having a population of patients who underwent only the two aforementioned procedures, the inclusion criteria were applied (see Table 1). Patients with clotting diseases that increase the risk of bleeding such as some type of hemophilia, Von Willebrand disease, protein C or S deficiencies were excluded from the study. Similarly, only patients were included in whom the application of 1 g of tranexamic acid during anesthetic induction was reported.

After applying the inclusion and exclusion criteria, a population of 37 female patients was obtained, within the age range between 18 and 65 years, who had no history of coagulation diseases and who only underwent abdominoplasty plus liposuction.

Once the total number of cases to be reported was counted, it was decided to compare the blood count that was taken prior to surgery and with a blood count that was taken 12 hours after the procedure. Additionally, the weight of the flap that was

resected in the lipectomy, the fluids that were infiltrated for liposuction, and the fluids that were suctioned were reviewed.

The procedures were performed by a certified team made up of 1 anesthesiologist, 1 plastic surgeon, 1 surgical instrumenter, and 1 nursing assistant. Additionally, prior to surgery, acute normovolemic hemodilution was performed in all patients with 500 cc of blood, which was replaced with 500 cc of crystalloids in the first hour of surgery. Anesthetic induction was performed as follows: Cisatracurium 0.15 mg / kg as a neuromuscular relaxant, Midazolam 0.05 mg / kg as an inducer together with Fentanyl of 1-2 mcg / kg, Lidocaine 1mg / kg and Propofol 1-2 mg / kg. Maintenance of anesthesia was performed with Remifentanil 0.15 to 0.2 mcg / kg / min and Sevoflurane at 1 MAC.

Sample size

Due to the descriptive nature of the work, no formal sample size calculation was performed.

Statistical analysis

Quantitative variables are presented in the form of means and standard deviations, while qualitative variables are presented in the form of proportions and absolute numbers. In an exploratory way, a Wilcoxon rank test of related data was performed to evaluate the differences before and after hemoglobin (Hb) and hematocrit (Ht).

Finally, an exploratory Spearman correlation was performed to evaluate the correlation between hemoglobin delta and hematocrit delta with flap weight.

Ethical considerations

The institution where these procedures were performed is certified by the Bogotá Health Secretariat and all patients who participated in the study have a duly completed consent prior to performing the procedure.

Based on what is mentioned in resolution 8430 of 1993, we consider that the study carried out is a low-risk investigation since it seeks to report a series of cases [6].

On the other hand, being a retrospective study, the population of our study was taken as passive subjects who had no knowledge about the research to be carried out. Given this, it was decided to comment with the directors of the clinic who authorized it to be carried out (minutes of 03/13/20) taking into account the current regulations on the use of personal data. Data collection was supervised by the clinic's information and registry coordinator, in order to ensure the confidentiality and protection of personal data of the patients who participated in the study.

Results

The results obtained in the study can be viewed in Tables 2 and 3 (at the end of the text).

Table 2: Summary of results excel

	Average	Minimum value	Maximum value
Age (years)	39.79	26	46
Hb prequirúrgica (g/dl)	13.91	10.5	16.1
Hb prequirúrgica (g/dl)	42.08	25.6	47
Hb postquirúrgico (g/dl)	10.81	8.2	13
Post-surgical Ht (%)	33.08	25.2	38.4
Infiltrated liquids (cc)	4972.97	2300	9000
Suctioned liquids (cc)	4356.75	1700	7500
Flap weight (gr)	858.37	200	3540
Delta Hb	3.1	-	-
And I and others and H	8.99	-	-

The age of the patients who participated in the study was first compared. It was determined that the mean age of the patients was 39.7 years. The youngest patient in the study was 24 years old and the oldest patient was 64 years old.

By looking at the pre and post surgical blood counts, several results can be obtained. The average pre hemoglobin was 13.9 g / dl and the pre hematocrit was 42.1%, while the average post hemoglobin was 10.8 g / dl and the post hematocrit was 33.1%.

Taking the values of the pre and post hemograms, it was possible to determine the delta of the change in hemoglobin and hematocrit for each of the patients. The mean hemoglobin delta was 3.1 g / dl while the hematocrit delta was 8.99%.

In only one patient, Hb was less than 12 g / dl prior to the procedure. No patient in the study had a post-procedure Hb lower than 8 g / dl. The lowest Hb value found after the procedure was 8.2 g / dl. Likewise, no patient in the study required a red blood cell transfusion after the procedure.

The infiltrated and suctioned fluids were then compared. The average amount of liquids used for infiltration was 4972.9 cc of Klein's solution. On the other hand, the average amount of fluid suctioned during liposuction was 4356.7 cc. Regarding the fluid balance between infiltrated and suctioned fluids, it was evidenced that in 9 patients it had a negative value (which meant that more fluids were suctioned), while in 27 patients the balance had a positive value (which meant that they were infiltrated more fluids) and only 1 patient had a balance of 0 (sucked fluids were equal to infiltrated fluids).

Additionally, the weights of the flaps were compared. The average weight of the resected flap during abdominoplasty was 858.3 grams. The resected flap with the highest weight was 3540 grams, while the flap with the lowest weight was 200 grams.

Taking these data mentioned, it was decided to perform a Spearman correlation between post-surgical hemoglobin and suctioned fluids, which was 0.056. This means that there is no

direct correlation between these variables. Likewise, a correlation was made between the post-surgical hematocrit and the sucked fluids, which was -0.022, so there is no association and a correlation between the hemoglobin delta and the sucked fluids, which was 0.05, so neither there was association.

Age was also not correlated with post-surgical hemoglobin, since it presents an index of -0.23, so there was no association.

Finally, it was decided to make a correlation between the weight of the flap and other study variables. The correlation between flap weight and post-surgical hemoglobin was -0.16, so there was no association. Similarly, a correlation was made between the weight of the flap and the hemoglobin delta, which had a coefficient of 0.046, so there was no association (the data presented in the Spearman correlation can be viewed in Table 3).

Table 3: Patient data.excel

pa tie nt ag e	Hb pr e	Ht o pr e	Hb po st	Ht o po st	inf iltr at or s	su ck ed	fla p	De lta Hb	De lta Ht o	Ba lan ce li qu ids
33	14,8	45,3	11,6	34,9	3500	3700	380	3,2	10,4	-200
31	13,4	40,7	11,5	33,2	5000	4800	800	1,9	7,5	200
40	14,7	43,2	11,9	35,3	9000	7100	560	2,8	7,9	1900
47	13	39	13	38	4500	3600	430	0	1	900
45	15,3	46,8	10,9	34,4	5000	3000	1100	4,4	12,4	2000
39	13	39	11,1	35	3500	3500	450	1,9	4	0
53	12	38	11,1	36,6	7000	4800	720	0,9	1,4	2200
34	14,1	42,9	11,3	34,1	3500	3100	460	2,8	8,8	400
26	13,6	42,6	10,7	32,9	4000	3000	300	2,9	9,7	1000
56	14,1	43,4	9,8	31,4	2500	1700	300	4,3	12	800
45	14,2	44,5	9,6	28,4	4000	4500	250	4,6	16,1	-500
45	12,1	25,6	8,8	26,7	4800	4600	1170	3,3	-1,1	200
39	13,8	40,4	11,9	35	6000	4900	290	1,9	5,4	1100
41	13,5	43,1	10,2	30,9	7000	6600	2640	3,3	12,2	400
33	14,8	45,3	11,6	34,9	3000	3600	680	3,2	10,4	-600
42	13,1	38,4	11,6	37,7	6500	5900	340	1,5	0,7	600
44	14,4	42,2	10	31,2	5500	3300	200	4,4	11	2200

34	14,1	42,9	11,3	34,1	45,00	40,00	50,0	2,8	8,8	50,0
45	15,3	45,3	12	35,8	48,00	47,50	12,20	3,3	9,5	50
42	15,1	43,7	12,8	38,4	50,00	48,00	48,0	2,3	5,3	20,0
39	15,5	44,1	10,9	33,3	38,00	53,00	90,0	4,6	10,8	-15,00
40	14,7	45,5	10,8	32,9	36,00	38,00	28,0	3,9	12,6	-20,0
31	14,7	43,4	11,3	35,4	50,00	51,00	20,0	3,4	8	-10,0
37	14,3	46,3	10	30	23,00	20,00	46,0	4,3	16,3	30,0
42	13,8	41,4	10,5	32,7	40,00	45,00	16,00	3,3	8,7	-50,0
44	16,1	46,8	11,3	36,4	60,00	46,00	11,00	4,8	10,4	14,00
32	13,4	38,9	10,3	30,6	70,00	60,00	35,40	3,1	8,3	10,00
34	15,1	45,2	11,8	36,9	50,00	42,00	90,0	3,3	8,3	20,0
31	15,2	47	10,4	30,3	60,00	61,00	99,0	4,8	16,7	-10,0
37	14,7	42,8	10,7	30,3	50,00	75,00	14,50	4	12,5	-25,00
30	13,5	41,2	11,4	34,5	50,00	22,00	11,00	2,1	6,7	28,00
32	13,8	43,3	12,3	38,	60,00	43,00	11,00	1,5	5,1	17,00
47	10,5	34,6	8,4	27,2	60,00	47,00	11,30	2,1	7,4	13,00
45	13,2	40,4	8,2	25,6	57,00	49,50	10,20	5	14,8	75,0
38	12,5	39,7	8,2	25,2	50,00	46,00	84,0	4,3	14,5	40,0
64	13,5	47	10,5	34	50,00	25,00	70,0	3	13	25,00
33	12,1	37,1	10,5	31,8	50,00	36,00	11,80	1,6	5,3	14,00

Table 4: Spearman.excel correlation

	age	Hb pre	Ht pre	Hb post	Ht post	infiltrat or s©	sucked	flap	ΔHb	ΔHto
age	1,000									
Hb pre	-0,1419	1,000								
Ht pre	-0,0471	0,8434	1,000							

Hb post	-0,2335	0,3295	0,1674	1,000						
Ht post	-0,0397	0,2667	0,1585	0,9154	1,000					
infiltrat or s©	0,0676	-0,2086	-0,2807	0,0369	0,105	1,000				
sucked	-0,0456	0,0425	-0,1867	0,0566	-0,0221	0,6273	1,000			
flap	-0,0096	-0,112	-0,1505	-0,1685	-0,2203	0,3493	0,3125	1,000		
ΔHb	0,1282	0,5463	0,5357	-0,5402	-0,5204	-0,1739	0,0592	0,0461	1,000	
ΔHto	0,0385	0,4434	0,6327	-0,5193	-0,562	-0,2296	-0,0916	-0,0424	0,8198	1,000

Discussion

Summary of Results

Based on the results previously presented, it can be seen that there are statistically significant differences between hemoglobin and hematocrit before and after surgery, since the p value is less than 0.05 in the Wilcoxon test. This means that post-surgical Hb and Ht show a significant reduction compared to pre-surgical hemoglobin and hematocrit. This result is expected, since liposuction inevitably sucks blood. Despite a reduction in hemoglobin and hematocrit, no patient required a red blood cell transfusion after surgery or had hemoglobin below 8 g / dl. These parameters are important, since they were the objectives that were sought to be achieved with the application of tranexamic acid.

On the other hand, a Spearman correlation was made between post-surgical hemoglobin and suctioned fluids, which was 0.056. This means that there is no direct correlation between these variables. Likewise, a correlation was made between the post-surgical hematocrit and the suctioned fluids, which was -0.022, so there is no association and a correlation between the hemoglobin delta and the sucked fluids, which was 0.05, so neither there was association.

Age was also not correlated with post-surgical hemoglobin, since it presents an index of -0.23, so there was no association.

Finally, it was decided to make a correlation between the weight of the flap and other study variables. The correlation between flap weight and post-surgical hemoglobin was -0.16, so there was no association. Similarly, a correlation was made between the weight of the flap and the hemoglobin delta, which had a coefficient of 0.046, so there was no association.

Previous evidence

Although the evidence on the use of tranexamic acid in plastic surgery is scarce [7-9], interesting studies can be found on this topic. In 2018 in Rio de Janeiro, Brazil, Consanção et al [5] carried out a prospective study in which they wanted to evaluate the effects of tranexamic acid in reducing perioperative bleeding in patients who were going to undergo liposuction. For this, the author divided a group of women into 2 cohorts, one experimental to which 10 mg of tranexamic acid was applied prior to liposuction and another control cohort that received 0.9% saline solution only. After surgery, a comparison was made of the hematocrit levels and the amount of blood in the volume of lipoaspirate. In the end, it was concluded that the experimental group to which tranexamic acid was applied presented higher levels of postoperative hematocrit, less reduction in hematocrit with respect to the initial values and lower blood volume in liposuction.

The study mentioned above is very useful as it has similar features to the study outlined in this article. The Consanção study population has characteristics similar to the population in our study, since they are women who undergo liposuction. Additionally, in both studies hematocrit was used as a measure to define postoperative bleeding.

Despite the similarities mentioned, the Consanção study has important differences with respect to our study. The main difference is that Consanção's research used a control group and an experimental group, which allowed him to compare the results of both groups. In contrast, our study only seeks to report a series of cases and a controlled clinical study was not carried out. On the other hand, Consanção used the Klein equation to determine the total volume of blood in the lipoaspirate, while this variable was not taken into account in our study.

Implications for research

The objective of the research that was carried out is to establish the basis for further research to expand the knowledge on the use of tranexamic acid in cosmetic surgery. We consider that with the findings presented in this study, investigations involving a larger population or experimental and control groups can be carried out, since this type of study would have greater statistical and epidemiological value.

Implications for practice

The results presented previously are intended to provide health professionals with another possibility in the management

of postoperative bleeding in cosmetic procedures. As previously mentioned, controlling bleeding during surgery could ensure a postoperative period with fewer complications and greater patient satisfaction.

It is important to clarify that the study only considers one management possibility.

Conclusion

Finally, it is considered that tranexamic acid presents incipient beneficial results for the management of perioperative bleeding during abdominoplasty plus liposuction. These results serve as the basis for conducting studies with greater methodological rigor on the effects of this drug in body cosmetic surgery.

References

1. Surgery IS of AP. ISAPS International Survey on Aesthetic / Cosmetic Procedures Performed in 2018. 2013;1–16.
2. Dixit V V., Wagh MS. Unfavourable outcomes of liposuction and their management. *Indian J Plast Surg.* 2013;46(2):377–392.
3. Samdal F, Amland PF, Bugge JF. Blood loss during liposuction using the tumescent technique. *Aesthetic Plast Surg.* 1994;18(2):157–60.
4. Venkataram J. Tumescent liposuction: A review. *J Cutan Aesthet Surg.* 2008;1(2):49.
5. Cansancao AL, Condé-Green A, David JA, Cansancao B, Vidigal RA. Use of Tranexamic Acid to Reduce Blood Loss in Liposuction. *Plast Reconstr Surg.* 2018;141(5):1132–1135.
6. Colombia M de S. RESOLUCION NUMERO 8430 DE 1993 (Octubre 4). 1993;1–19.
7. Oliver JD, Deloughery EP, Gupta N, Boczar D, Sisti A, Huayllani MT, et al. Local pro-and anti-coagulation therapy in the plastic surgical patient: A literature review of the evidence and clinical applications. *Med.* 2019;55(5):1–8.
8. Ghavimi MA, Taheri Talesh K, Ghoreishzadeh A, Chavoshzadeh MA, Zarandi A. Efficacy of tranexamic acid on side effects of rhinoplasty: A randomized double-blind study. *J Cranio-Maxillofacial Surg [Internet].* 2017;45(6):897–902.
9. Murphy GRF, Glass GE, Jain A. The efficacy and safety of tranexamic acid in cranio-maxillofacial and plastic surgery. *J Craniofac Surg.* 2016;27(2):374–379.