Reporte de casos sobre el uso de ácido tranexámico para reducir el sangrado perioperatorio en liposucción y abdominoplastia

Cases report on the use of tranexamic acid to reduce perioperative bleeding in liposuction and abdominoplasty procedures

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Abstract

Introduction: Liposuction and abdominoplasty are two of the most common aesthetic surgeries practiced in the world. One of the most frequent complications of these procedures is the perioperative blood loss, which has negative effects on the recovery of the patients after the surgery. For this reason, it is important to search for new possibilities that reduce blood loss during this type of surgery.

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

Methods: We present a retrospective case series report in which 1 gram of tranexamic acid was applied to a group of patients before the surgery. Later we reviewed and compared an hemogram taken before and after the surgery. Additionally, we evaluate if the patients required blood transfusion after the procedure.

Results: A population of 37 female patients was studied. None of the patients presented a postsurgical hemoglobin level lower than 8 g/dl nor required blood transfusion products after surgery. A Spearman's rank correlation was performed between the variables, in which there was no evidence of association between lipoaspirate, and hemoglobin or postoperative hematocrit.

Conclusion: The tranexamic acid is a medicament that can be useful for reducing perioperative blood loss in liposuction and abdominoplasty, such

results were proved since none of the patients who received the medication required transfusion of red blood cells.

Key words: Tranexamic acid, liposuction, abdominoplasty, hemorrhage

Introducción

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

One of the main complications of these aesthetic procedures is bleeding, which if it is not controlled can lead to inadequate postoperative periods or even death (2). Regarding the pathophysiology of bleeding during this type of surgical procedure, it is known that when performing liposuction with the suction cannulas, blood vessels and adjacent tissue are injured, which produces bleeding (2). Samdal et al proposes 3 ways by which the blood that was extravasated by the tissues and blood vessels injury is lost: An external loss in the liposuction, an internal loss due to the formation of dead space when removing fat and the blood that is 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 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 (called Klein's solution) (4). Subsequently, 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 plasmino-

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gen to plasmin, which prevents the degradation of fibrin and preserves the structure of the clot (5). By this mechanism of action, tranexamic acid could be useful in decreasing bleeding, as it would act in conjunction with Klein's solution reducing 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 founded expose the benefits of this drug in the management of burns, maxillofacial surgery, and otolaryngology. For this reason, it was decided to conduct a descriptive study with the aim of evaluating postoperative bleeding and the need for transfusion in patients who were administered tranexamic acid during liposuction and abdominoplasty.

Materials y Methods

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

a. Population

For the case report, the medical records of the patients who underwent surgery at the "Santa Barbara Surgical Center" clinic in the city of Bogotá between 15/01/2020 and 15/03/2020 were reviewed. For this study, patients who underwent abdominoplasty plus body liposuction were included and whom the application of 1 gr of tranexamic acid during anesthetic induction was reported; the patients who underwent another additional procedure were excluded from the study as well as patients with clotting diseases that increase the risk of bleeding such as some type of hemophilia, von Willebrand disease, protein C deficiencies. Table 1 is shown the eligibility criteria:

Table 1. Eligibility criteria.

Inclusion Criteria	Criterios de Exclusión
Surgery performed: Abdominoplasty + Liposuction	Hypersensitivity to tranexamic acid
Age: 18 – 65	Presence of coagulation diseases
Application of tranexamic acid	Abdominoplasty + Liposuction + Other Procedure
Patients ASA I or II	Male

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

Once the total number of cases that were going to be reported were determined, it was decided to compare the blood count that was taken before 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 infiltrated for liposuction and the fluids that were suctioned were reviewed.

The procedures were performed by a certified team consisting of 1 anesthesiologist, 1 plastic surgeon, 1 surgical technologist and 1 nursing assistant. Additionally, prior to surgery, acute normovolemic hemodilution with 500 cc of blood was performed in all patients, which is replenished with 500 cc of crystalloid 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 along with Fentanyl 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 to 1 MAC.

b. Sample size

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

c. Statistical analysis

Quantitative variables are presented in the form of averages and standard deviations, while qualitative variables are presented in the form of absolute proportions and numbers. A Wilcoxon range test of related data was performed exploratorily to assess before and after differences in hemoglobin (Hb) and hematocrit (Hto). Finally, a Spearman correlation was performed exploratorily to evaluate the correlation between hemoglobin delta and hematocrit delta with flap weight.

d. Ethical considerations

The institution where these procedures were performed is certified by the Ministry of Health of Bogotá and all patients who participated in the study have a duly completed consent prior to performing the procedure. Based on what was mentioned in resolution 8430 of 1993, we consider that the study carried out is an investigation with low risk since it seeks to report a series of cases (6). On the other hand, by this being a retrospective study, the population of our study was taken as passive subjects those who had no knowledge about the research that would be carried out. Given this, it was decided to comment with the directors of the clinic who authorized

the realization of the same (act of 13/03/20) considering the current regulations on the use of personal data. The data collection was supervised by the information and registration coordinator of the clinic, this in order to ensure the confidentiality and protection of personal data of the patients who participated in the study.

Result

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 who was in the study was 24 years old and the older patient was 64 years old.

By looking at the pre and post surgical blood counts, several results can be obtained. The mean 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 post hematocrit was 33.1%.

Having the values of the pre and post blood counts, it was possible to determine the delta of the change of 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 a single patient, a pre-procedure Hb of less than 12 g/dl was evident. No patient in the study had a post-procedure Hb of less than 8 g/dl. The Hb of lower value that was found after the performance of the procedure was 8.2 g/dl. Likewise, no patient in the study required red blood cell transfusion after the procedure. The infiltrated and sucked liquids were then compared. The average amount of liquids used for infiltration was 4972.9 cc of Klein solution. On the other hand, the average amount of fluids that were suctioned during liposuction was 4356.7 cc. Regarding the balance of fluids between infiltrated and sucked liquids, it was evidenced that in 9 patients it had a negative value (which meant that more fluids were sucked), while in 27 patients the balance had a positive value (which meant that more liquids were infiltrated) and only 1 patient had a balance of 0 (the sucked liquids were equal to the infiltrated liquids).

Additionally, the weights of the flaps were compared. The average weight of the resected flap during the abdominoplasty was 858.3 grams. The highest weight flap was 3540 grams while the lowest weight flap was 200 grams. Table 2 shows the obtain results:

Tabla 2. Resumen de resultados

	Promedio	Valor mínimo	Valor máximo
Edad (años)	39.79	26	46
Hb prequirúrgica (g/dl)	13.91	10.5	16.1
Hto prequirúgico (%)	42.08	25.6	47
Hb post quirúrgico (g/dl)	10.81	8.2	13
Hto post quirúrgico (%)	33.08	25.2	38.4
Líquidos infiltrados (cc)	4972.97	2300	9000
Líquidos succionados (cc)	4356.75	1700	7500
Peso del colgajo (gr)	858.37	200	3540
Delta Hb	3.1	-	-
Delta de Hto	8.99	-	-

Having these data mentioned, it was decided to perform a Spearman correlation between post-surgical hemoglobin and suction 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 suction fluids which was -0.022, so there is no association and a correlation between the hemoglobin delta and the suction fluids, which was 0.05 so there was no association either. Age was also not correlated with post-surgical hemoglobin since it has an index of -0.23 so there was no association.

Table 3. Spearman correlation.

	Age	Pre Hb	Pre Hto	Post Hb	Post Hto	Infiltrated (cc)	Suctioned (cc)	Flap (g)	Δ Hb	Δ Hto
Age	1.000									
Pre Hb	-0,1419	1.000								
Pre Hto	-0,0471	0,8434	1.000							
Post Hb	-0,2335	0,3295	0,1674	1.000						
Post Hto	-0,0397	0,2667	0,1585	0,9154	1.000					
Infiltrated (cc)	0,0676	-0,2086	-0,2807	0,0369	0,105	1.000				
Suctioned (cc)	-0,0456	0,0425	-0,1867	0,0566	-0,0221	0,6273	1.000			
Flap (g)	-0,0096	-0,112	-0,1505	-0,1685	-0,2203	0,3493	0,3125	1.000		
Δ Hb	0,1282	0,5463	0,5357	-0,5402	-0,5204	-0,1739	0,0592	0,0461	1.000	
Δ Hto	0,0385	0,4434	0,6327	-0,5193	-0,562	-0,2296	-0,0916	-0,0424	0,8198	1.000

Finally, it was decided to make a correlation between the weight of the flap and other variables of the study. The correlation between flap weight

The average weight of the resected flap during the abdominoplasty was 858.3 grams.

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 (Table 4).

Table 4. Other variables correlation.

Patience age	Pre Hb	Pre Hto	Post Hb	Post Hto	Infiltrated	Suctioned	Flap	Hb Delta	Hto Delta	Liquid Balance
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	4500	4000	500	2,8	8,8	500
45	15,3	45,3	12	35,8	4800	4750	1220	3,3	9,5	50
42	15,1	43,7	12,8	38,4	5000	4800	480	2,3	5,3	200
39	15,5	44,1	10,9	33,3	3800	5300	900	4,6	10,8	-1500
40	14,7	45,5	10,8	32,9	3600	3800	280	3,9	12,6	-200
31	14,7	43,4	11,3	35,4	5000	5100	200	3,4	8	-100
37	14,3	46,3	10	30	2300	2000	460	4,3	16,3	300
42	13,8	41,4	10,5	32,7	4000	4500	1600	3,3	8,7	-500
44	16,1	46,8	11,3	36,4	6000	4600	1100	4,8	10,4	1400
32	13,4	38,9	10,3	30,6	7000	6000	3540	3,1	8,3	1000
34	15,1	45,2	11,8	36,9	5000	4200	900	3,3	8,3	800
31	15,2	47	10,4	30,3	6000	6100	990	4,8	16,7	-100
37	14,7	42,8	10,7	30,3	5000	7500	1450	4	12,5	-2500
30	13,5	41,2	11,4	34,5	5000	2200	1100	2,1	6,7	2800
32	13,8	43,3	12,3	38,2	6000	4300	1100	1,5	5,1	1700
47	10,5	34,6	8,4	27,2	6000	4700	1130	2,1	7,4	1300
45	13,2	40,4	8,2	25,6	5700	4950	1020	5	14,8	750
38	12,5	39,7	8,2	25,2	5000	4600	840	4,3	14,5	400
64	13,5	47	10,5	34	5000	2500	700	3	13	2500
33	12,1	37,1	10,5	31,8	5000	3600	1180	1,6	5,3	1400

Discussion

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

On the other hand, the Spearman correlation show that there was no association between: 1) post-surgical hemoglobin and suction fluids which was 0.056; 2) post-surgical hematocrit and the suction fluids which was -0.022; 3) hemoglobin delta and the suction fluids which was 0.05; 4)Age and post-surgical hemoglobin since it has an index of -0.23; 5) the weight of the flap and post-surgical hemoglobin was -0.16; 6) the weight of the flap and the hemoglobin delta which had a coefficient of 0.046

Previous evidence

Although evidence on the use of tranexamic acid in plastic surgery is scarce (7)(8)(9), interesting studies on this topic can be found. In 2018 in Rio de Janeiro, Brazil, Consanção et al (5) conducted 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, an experimental one to which 10 mg of tranexamic acid was applied prior to liposuction and another control cohort that received 0.9% saline only. After surgery, a comparison of hematocrit levels and the amount of blood in liposuction volume was performed. In the end, it was concluded that the experimental group to which tranexamic acid was applied presented higher levels of postoperative hematocrit, less reduction of hematocrit compared 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 proposed in this article. The population of the Consanção study has characteristics like the population of 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, Consanção's study has important differences from 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. Instead, our study only seeks to report a number of cases and no controlled clinical study was done. On the other hand, Consanção used the Klein equation to determine the total volume of blood in the liposuction, while for our study this variable was not considered.

«The main difference is that Consanção's research used a control group and an experimental group, »

Implications for research

The research that was carried out aims to lay the foundations for additional research to expand knowledge about the use of tranexamic acid in cosmetic surgery. We believe that with the findings presented in this study, research can be carried out that involves a larger population or experimental and control groups, since this type of studies would have greater statistical and epidemiological value.

Implications for practice

The results presented above aim to provide health professionals with another possibility in the management of postoperative bleeding in esthetic 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 raises a possibility of management.

Conclusion

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

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