

**Autotransfusion System (AutoLog IQ) use in liposuction: a retrospective case-control study**

**Uso do Sistema de Autotransusão (AutoLog IQ) em lipoaspiração: um estudo retrospectivo de caso-controle**

**Sistema de autotransfusión (AutoLog IQ) en liposucción: un estudio retrospectivo de casos y controles**

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## ABSTRACT

**Justification:** Liposuction represents 15.4% of all surgical procedures, with mortality rates of 0.38-0.55 per 1000 procedures. Blood loss and anemia are related to mortality and fluid replacement lowers hemoglobin drop. **Objective:** To perform a retrospective case-control study to evaluate the autotransfusion system (Autolog IQ) use in lipoplasty. **Methodology:** Patients' from the Instituto Mineiro de Cirurgia Plástica (Belo Horizonte) who had surgery in July-August 2023 had their medical charts evaluated. In the intervention group, fat removal and collection, with posterior washing was process in the Autolog IQ. The Autolog IQ, through a centrifugation process, spares and collects viable red blood cells, enabling autotransfusion. R Studio was used for statistical analysis. **Results:** 36 patients were included, of which 19 (52.8%) used Autolog with median blood infusion of 1031.93ml (n=15). The Autolog group had higher aspirated volume ( $4881.58 \pm 2287.6$ ml, range: 2000-11600ml *versus*  $3761.76 \text{ml} \pm 1344.38$ ml, range: 2000-6200ml) and body weight aspirated volume ( $6.78\% \pm 2.9\%$ , range: 2.94%-11.88% *versus*  $5.47\% \pm 1.77\%$ , range: 3.47%-8.49%). No statistical significance was found in: surgery time (p=0.95); diuresis (p=0.19); Hemoglobin (p=0.19), platelets (p=0.46), serum iron (p=0.64), ferritin (p=0.9), and prothrombin response (p=0.54); pain scale (p=0.29), seroma (p=0.89) and its volume (p=0.07); necrosis and thrombophlebitis (p=0.31); dehiscence (p=0.26); epidermolysis and infection (p=0.45). There was no statistical significance in subgroups analysis. **Conclusion:** No statistical difference was observed between the groups for clinical and laboratory outcomes. The difference in aspirated volume between groups may have increased heterogeneity.

**Keywords:** lipectomy, lipoabdominoplasty, blood transfusion, cosmetic techniques, plastic surgery procedures.

## RESUMO

**Justificativa:** A lipoaspiração representa 15,4% de todos os procedimentos cirúrgicos, com taxas de mortalidade de 0,38-0,55 por 1000 procedimentos. Perda de sangue e anemia estão relacionadas à mortalidade, e a reposição de líquidos reduz a queda de hemoglobina. **Métodos:** Realizamos um estudo de caso-controle retrospectivo para avaliar o uso do sistema de autotransfusão (Autolog IQ) em lipoaspiração. **Metodologia:** Os pacientes do Instituto Mineiro de Cirurgia Plástica (Belo Horizonte) que passaram por cirurgia em julho-agosto de 2023 tiveram seus prontuários médicos avaliados. No grupo de intervenção, a gordura foi removida, coletada e lavada, sendo posteriormente processada no Autolog IQ que por meio de um processo de centrifugação, preserva e coleta glóbulos vermelhos viáveis, permitindo a autotransfusão. O R Studio foi utilizado para análise estatística. **Resultados:** Foram incluídos 36 pacientes, dos quais 19 (52,8%) utilizaram o Autolog com uma infusão sanguínea mediana de 1031,93 ml (n=15). O grupo Autolog teve um volume aspirado maior ( $4881,58 \pm 2287,6$  ml, intervalo: 2000-11600 ml vs.  $3761,76 \text{ ml} \pm 1344,38$  ml, intervalo: 2000-6200 ml) e volume de aspiração ponderal ( $6,78\% \pm 2,9\%$ , intervalo: 2,94%-11,88% vs.  $5,47\% \pm 1,77\%$ , intervalo: 3,47%-8,49%). Não foi encontrada significância estatística em: tempo de cirurgia (p=0,95); diurese (p=0,19); Hemoglobina (p=0,19), plaquetas (p=0,46), ferro sérico (p=0,64), ferritina (p=0,9) e resposta à protrombina (p=0,54); escala de dor (p=0,29), seroma (p=0,89) e seu volume (p=0,07); necrose e tromboflebite (p=0,31); deiscência (p=0,26); epidermólise e infecção (p=0,45). **Conclusão:** Não foi observada diferença estatística entre os grupos para os resultados clínicos e laboratoriais. A diferença do volume aspirado entre os grupos pode ter aumentado a heterogeneidade.

**Palavras-chave:** lipectomia, lipoabdominoplastia, transfusão de sangue autóloga, técnica cosméticas, procedimentos de cirurgia plástica.

## RESUMEN

**Justificación:** La liposucción representa el 15,4% de todos los procedimientos quirúrgicos, con tasas de mortalidad de 0,38-0,55 por 1000 procedimientos. La pérdida de sangre y la anemia están asociadas con la mortalidad, y la reposición de fluidos disminuye la caída de hemoglobina. **Métodos:** Realizamos un estudio retrospectivo de caso-control para evaluar el uso del sistema de autotransfusión (Autolog IQ) en lipoplastia. En el grupo intervención, la extracción y recolección de grasa, con posterior lavado, se realizó con el Autolog IQ, que, mediante centrifugación, conserva y recolecta glóbulos rojos viables para autotransfusión. **Métodos:** Se revisaron los expedientes médicos de pacientes del Instituto Mineiro de Cirugía Plástica (Belo Horizonte) que se sometieron a cirugía en julio-agosto de 2023. Se utilizó R Studio para el análisis estadístico. **Resultados:** Se incluyeron 36 pacientes; 19 (52,8%) usaron Autolog con una infusión media de sangre de 1031,93 ml (n=15). El grupo Autolog mostró un mayor volumen aspirado ( $4881,58 \pm 2287,6$  ml, rango: 2000-11600 ml frente a  $3761,76 \pm 1344,38$  ml, rango: 2000-6200 ml) y porcentaje de volumen aspirado en relación al peso corporal ( $6,78\% \pm 2,9\%$ , rango: 2,94%-11,88% frente a  $5,47\% \pm 1,77\%$ , rango: 3,47%-8,49%). No se encontraron diferencias significativas en: tiempo de cirugía (p=0,95), diuresis (p=0,19), hemoglobina (p=0,19), plaquetas (p=0,46), hierro sérico (p=0,64), ferritina (p=0,9), respuesta a la protrombina (p=0,54), escala de dolor (p=0,29), seroma (p=0,89) y su volumen (p=0,07), necrosis y tromboflebitis (p=0,31), dehiscencia (p=0,26), epidermólisis e infección (p=0,45). **Conclusión:** No se observaron diferencias estadísticas entre los grupos en los resultados clínicos y de laboratorio. La variación en el volumen aspirado puede haber aumentado la heterogeneidad.

**Palabras clave:** lipectomía, lipoabdominoplastia, autotransfusión, técnicas cosméticas, procedimientos quirúrgicos, cirugía plástica.

## 1 INTRODUCTION

Liposuction is the most common aesthetic procedure performed in 2022 (15.4% of all surgical procedures) according to the International Society of Aesthetic Plastic Surgery (ISAPS) Global Survey.<sup>(1)</sup> Despite its incidence, liposuction has its risks. According to a systematic review, mortality rates range from 0.38 per patient and of 0.55 per 1000 procedures.<sup>(2)</sup> If combined with abdominoplasty, mortality ranges from 0.006 to 0.01 per 1000 patients.<sup>(3)</sup> Despite venous thromboembolism being the most responsible for postoperative deaths (21%),<sup>(4)</sup> blood loss and anemia has its importance, being related to a hemoglobin (Hb) drop and dizziness, dyspnea, tachycardia, and orthostatic hypotension.<sup>(5)</sup> For this, fluid replacement is necessary.

Back in 1990 it was already estimated that major liposuction required blood and fluid replacement, and its lack was associated with cardiopulmonary complications due to low fluid resuscitation. It's estimated that a 70kg adult should replace at least 2000mL of fluids. Correct fluid replacement was correlated in a study with 146 patients, which removed a median volume

of 2200 mL, to lower hemoglobin drop, fast reticulocytotic recovery, and fast return to full work activities (seven days earlier when compared to non-transfused patients;  $p < 0.01$ ).<sup>(6)</sup>

Despite being an invasive procedure, about 5 liters of fat can be safely removed in a single procedure, depending on the number of areas involved.<sup>(7)</sup> Furthermore, the procedure is only indicated for healthy patients with steady weight.<sup>(7-9)</sup> For this, whenever 1500mL or over are removed, fluid replacement is highly recommended.<sup>(6)</sup>

Therefore, we seek to evaluate, through a retrospective case-control study, the use of the mechanically assisted lipoplasty technique associated with the autotransfusion system (Autolog IQ) and the Medtronic washing set that aims to collect, concentrate, wash and infuse autologous blood.

## 2 METHODS

### 2.1 ELIGIBILITY CRITERIA AND ENDPOINTS

We aimed to assess whether the use of Autolog IQ together with the Medtronic lavage set during liposuction impacts the clinical and laboratory parameters of patients compared to those who did not use the technology. For this, we performed a retrospective analysis of patients' who performed liposuction at the Instituto Mineiro de Cirurgia Plástica at Belo Horizonte, Minas Gerais, Brazil. Regarding the main objective, since Autolog IQ use started in July 2023, data were collected only from the patients who were operated from July to August 2023, by the same surgical team, with similar technique. In all patients, liposuction was performed using the closed method with the vibroliposuction device with 4-millimeter Mercedes-type cannulas or with multi-hole cannulas from FAGA medical. Occasionally, the washed fat was used for grafting.

The intervention group was composed of patients who had indications of Autolog IQ use due to complications risk factors. In these patients the autolog was used during the procedure, with fat removal and collection, with posterior washing with saline solution. The washed liquid was collected and processed in the Autolog IQ. The Autolog IQ processes the liquid through a centrifugation process, separating viable red blood cells that are collected into a blood bag and retransfused back to the patient. The control group contained patients who didn't follow Autolog's use recommendation or which didn't have it recommended. We stopped collecting data after the number of patients included in the control group was similar to the Autolog IQ group. Study size evaluation was not performed and, since it is an innovative

technique, we aim to publish again in this area with further results and evaluation. Randomization was not possible due to the patients' different needs in aesthetic surgeries and due to Autolog IQ's cost.

We included patients that met all the following eligibility criteria: (1) submitted to a liposuction; (2) stable before the procedure; (3) had any of the outcomes of interest registered. We excluded patients who were under 18 years old and males, due to the small sample of males who performed liposuction, which could generate bias.

The outcomes of interest were: (1) Surgery time; (2) quantity of volume infiltrated; (3) amount of liquids infused; (4) volume aspirated; (5) body weight percentage of aspirated volume; (6) diuresis; (7) Hb, platelets, serum iron, ferritin and prothrombin time response; (8) pain scale; (9) seroma and amount aspirated; and (10) other complications rate, such as necrosis, thrombophlebitis, dehiscence, epidermolysis and infection.

## 2.2 DATA EXTRACTION AND SUBGROUP ANALYSES

Data were extracted, blinded, from patient records by one member of the research team (JAO) and checked by another (LCG). If there were any other procedure concomitant to liposuction, it was registered to allow subgroups evaluation.

We aim to associate Hb response and pain scale to body weight aspirated percentage. We aim to expose the range and mean age and weight among groups to see if the groups had similar characteristics. A 15-days follow-up was performed, being considered that the patients had at-home visits three days after surgery, by a nurse, who evaluated the patient's pain scale and earlier need of medical evaluation. The patients returned 7 days after the procedure for a medical evaluation and, if needed, 15 days after the procedure. Seroma aspiration was only performed ambulatory, and we noted the first volume aspirated.

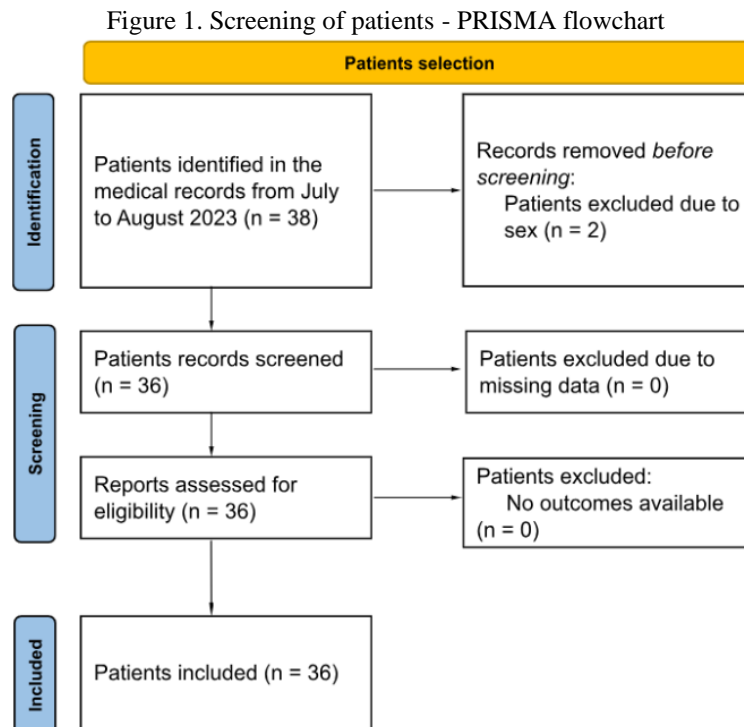
### 2.2.1 Statistical analysis and quality assessment

RStudio (PBC, Boston, MA) was used for statistical analysis by JAO. As effect measures to compare pooled effects for binary endpoints we used Mean Deviation (MD) with 95% confidence intervals (CI). The DerSimonian and Laird random effect model was used for all outcomes. We used the STROBE checklist for case-control studies.

Not all outcomes were able to be evaluated for all patients due to missing data. We didn't exclude any patients.

### 3 RESULTS

By applying the eligibility criteria, 36 patients' medical records were included in the study (Figure 1).



Source: Adapted from MOHER, D. et al. Preferred reporting item for systematic reviews and meta-analyses: The PRISMA statement. PLoS Med, v.7, n.9, 2010.

19 (52.8%) of our patients used Autolog IQ, and all had concomitant procedures performed with liposuction. Only eleven performed one procedure along with liposuction, being five abdominoplasty, three mastopexy (two with prosthesis), two bodytite and one Morpheus. Considering the other eight patients, six performed Morpheus and bodytite (two along with abdominoplasty, two along with mastopexy, and other two alone). The final patients had mastopexy along with abdominoplasty and with Morpheus. Of the 17 patients (47.2%) that didn't use AutoLog IQ, along with liposuction, one had Morpheus, one mastopexy, and five had abdominoplasty. Of the ten left, six had mastopexy performed along with abdominoplasty, of which one also had bodytite performed; three had bodytite along with mastopexy, of which one also included Morpheus; and one patient had Morpheus and bodytite performed.

Patients' characteristics can be better seen in Table 1.

Table 1. Characteristics of included patients and of the procedure

		<b>Total (n= 36)</b>	<b>Autolog IQ group (n= 19)</b>	<b>Control group (n = 17)</b>
<b>Age (y)<sup>a</sup></b>	Total	40.08	39.31 (range: 28 to 56)	39.83 (range: 21 to 56)
<b>Weight (kg)<sup>a</sup></b>	Total	70.11	71.48kg (range: 53.4 to 95.8kg)	68.22kg (range: 56.3 to 82kg)
<b>BMI<sup>a</sup></b>	Total	26.05	26.35 (range: 21.51 to 31.13)	25.69 (range: 20.93 to 32.56)
	Normal	23.12	23.37 (range: 21.51 to 24.81; n= 8)	22.87 (range: 20.93 to 23.72; n= 8)
	Overweight	27.28	27.26 (range: 25.96 to 29.07; n= 8)	27.04 (range: 25.14 to 29.67; n= 8)
	Obese	31.72	31.84 (range: 30.85 to 33.54; n= 3)	31.53 (range: 30.48 to 32.56; n= 2)
<b>Race</b>	White	27 (75%)	16 (84.2%)	11 (64.7%)
	Brown	7 (19.4%)	3 (15.8%)	4 (23.5%)
	Black	2 (5.6%)	0 (0%)	2 (11.8%)
<b>Associated procedure s/ techniques</b>	Abdominoplastia	14 (37.8%)	7 (36.8%)	7 (36.8%)
	BodyTite	14 (37.8%)	7 (36.8%)	7 (36.8%)
	Mastopexia	11 (30.5%)	6 (31.6%)	5 (29.4%)
	Morpheus	16 (43.2%)	8 (42.1%)	8 (42.1%)

Legend: for all evaluation it was given the whole value and/or percentage, except: <sup>a</sup>mean value. \*The analysis is presented for the groups (patients who used Autolog *versus* the ones who didn't) and its subgroups respectively. Source: Prepared by the authors.

### 3.1 AUTOLOG IQ VERSUS CONTROL GROUP

Regarding the procedure and its characteristics for each group, they were detailed in Table 2 and 3, exposing the main aspects of the surgery and the exams which appeared more frequently, enabling comparison, on the hospital's database. We found higher volume (4881.58 ± 2287.6ml, range: 2000 to 11600ml *versus* 3761.76ml ± 1344.38ml, range: 2000 to 6200ml) and body weight % aspirated volume (6.78% ± 2.9%, range: 2.94% to 11.88% *versus* 5.47% ± 1.77%, range: 3.47% to 8.49%) in the Autolog group, which could affect results due to heterogeneity. As for the Autolog group, it's important to notice the median blood infusion, which was of 1031.93ml (range: 362ml to 2339ml; n= 15).

Table 2. Procedure characteristics

	Total	Autolog IQ group	Control group	Statistical analyses		
				MD	95% CI	P-value
<b>Surgery time<sup>+</sup></b>	17h21m (n= 27)	7h32m ± 1h38m (range: 5h08min to 9h50min; n= 14)	7h36m ± 1h79m (range: 5h29m to 10h29m; n= 13)	-0.04	-1.25 to 1.17	0.95
<b>Infiltrated volume<sup>+</sup></b>	4192.50ml (n= 21)	4403.85ml ± 804.79 (range: 3200 to 5500ml; n= 14)	3800ml ± 886.94ml (range: 3000 to 5000ml; n= 7)	603.85	-176.81 to 1384.51	0.13
<b>Infusion<sup>+</sup></b>	2829ml (n= 21)	2692.86ml ± 551.17ml (range: 1600 to 3700; n=14)	3101.29ml ± 819.25ml (range: 2100 to 4609; n = 7)	-408.43	-1080.50 to 263.64	0.23
<b>Aspirated volume</b>	4352.78ml	4881.58ml ± 2287.6ml (range: 2000ml to 11600ml)	3761,76ml ± 1344.38ml (range: 2000ml to 6200ml)	1119.82	-91.15 to 2330.79	0.07
<b>Body weight % of aspirated volume</b>	6.16%	6.78% ± 2.9% (range: 2.94% to 11.88%)	5.47% ± 1.77% (range: 3.47% to 8.49%)	1.31	-0.24 to 2.86	0.10
<b>Diuresis<sup>+</sup></b>	391.90ml (n= 20)	371.43ml ± 152.81ml (range: 100ml to 600ml; n= 13)	432.86ml ± 193.8ml (range: 300ml to 800ml; n= 7)	-111.43	-277.30 to 54.44	0.19

Legend: for all evaluation it was given the mean value and Standard Deviation (SD); <sup>+</sup>missing data. \*The analysis is presented for the groups (patients who used Autolog *versus* the ones who didn't) and its subgroups respectively.

Source: Prepared by the authors.

Table 3. Patient's response comparing laboratory results before and after the procedure

	Total	Autolog IQ group	Control group	Statistical analyses*		
				MD	95% CI	p-value
<b>HB response</b>	-2.68 (n= 18)	-2.19 ± 1.5 (range: -4.7 to 0; n= 10)	-3.3 ± 2.21 (range -6.4 to -0.2; n= 8)	1.11	-0.55 to 2.77	0.19
<b>Platelets response</b>	- 7888.89 (n= 18)	5300 ± 87859.8 (range: -74000 to 165000; n= 10)	-24500 ± 82681.83 (range: -119000 to 128000; n= 8)	29800	-49244.40 to 108844.40	0.46
<b>Serum iron response</b>	-39.76 (n= 10)	-31.92 ± 55.1 (range -127 to 7; n= 5)	-47.6 ± 49.9 (range: -108 to 15; n= 5)	16.68	-49.48 to 80.84	0.64
<b>Ferritin response</b>	287.25 (n= 10)	291.12 ± 117.42 (range: 142.7 to 468.8; n= 5)	283.38 ± 71.43 (range: 222.6 to 404.7; n= 5)	7.74	-112.73 to 126.21	0.90
<b>Prothrombin time response</b>	0.61 (n= 11)	0.58 ± 0.85 (range -0.4 to 2.2; n= 8)	0.67 ± 0.25 (range: 0.4 to 0.9; n= 3)	-0.09	-0.38 to 0.20	0.54

Legend: for all evaluation it was given the mean value and Standard Deviation (SD) and was missing data. \*The analysis is presented for the groups (patients who used Autolog *versus* the ones who didn't) and its subgroups respectively.

Source: Prepared by the authors.

Patient's follow-up data was collected and presented below (Table 4). Seroma were mostly sacral (92%) and only 8% happened in the abdominal area. Thrombophlebitis only

occurred in the venous access site, and necrosis, epidermolysis, infection, and dehiscence only in patients who have had mastopexy. The infection happened 10 days after the procedure.

Table 4. Patient's follow-up data

	Total	Autolog IQ group	Control group	Statistical analyses*		
				MD	95% CI	P-value
<b>Pain Scale<sup>a</sup></b>	6.42	6.21 ± 1.23 (range: 5 to 9)	6.65 ± 1.27 (range: 5 to 9)	-0.44	-1.26 to 0.38	0.29
<b>Seroma</b>	25 (69.44%)	13 (68%)	12 (70.58%)	0.90	0.22 to 3.75	0.89
<b>Seroma aspirated volume<sup>a</sup></b>	295.8 (n= 25)	246.92ml ± 130.47ml (range 60 to 400ml; n=13)	348.75ml ± 151.93ml (range 30 to 525ml; n= 12)	-101.83	-213.27 to 9.61	0.07
<b>Necrosis</b>	2 (5.56%)	2 (10.53%)	0 (0%)			
<b>Thrombophlebitis</b>	2 (5.56%)	2 (10.53%)	0 (0%)	5	0.22 to 111.86	0.31
<b>Dehiscence</b>	4 (11.12%)	1 (5.23%)	3 (17.65%)	0.26	0.02 to 2.77	0.26
<b>Epidermolysis</b>	1 (2.78%)	0 (0%)	1 (5.88%)			
<b>Infection</b>	1 (2.78%)	0 (0%)	1 (5.88%)	0.28	0.01 to 7.40	0.45

Legend: for all evaluation it was given the whole value and percentage, except: <sup>a</sup>mean value. \*The analysis is presented for the groups (patients who used Autolog *versus* the ones who didn't) and its subgroups respectively. Source: Prepared by the authors.

### 3.2 SUBGROUPS

Due to the low number of patients, whenever the body weight % aspirated was of 5 to 7%, statistical analysis comparing both subgroups was not possible since only one patient from the control group fitted that criteria. For this, we only compared Hb response (Table 5) and pain scale (Table 6) to body weight aspiration until 5% and over 7%. No significance was found for Hb drop whenever over 7% of body weight volume was aspirated or pain scale increasement.

Table 5. Hb response association to body weight aspiration until 5% and over 7%

	Total	Autolog IQ group	Control group	Statistical analyses*		
				MD	95% CI	p-value
Until 5% of body weight volume aspiration	-2.26 ± 1.48	-2.26 ± 0.84 (range: -3.2 to -1.4; n= 5)	-2.26 ± 2.05% (range: -5.3 to -0.2; n= 5)	0	-1.94 to 1.94	1
Over 7% of body weight volume aspiration	-4.28 ± 0.43	-4.2 ± 0.7 (range -4.7 to -3.7; n= 2)	-4.35 ± 0.21 (range: -4.5 to -4.2; n= 2)	0.15	-0.86 to 1.16	0.77

Legend: for all evaluation it was given the whole value and percentage, except: <sup>a</sup>mean value. \*The analysis is presented for the groups (patients who used Autolog *versus* the ones who didn't) and its subgroups respectively. Source: Prepared by the authors.

Table 6. Pain scale association to body weight aspiration until 5% and over 7%

	Total	Autolog IQ group	Control group	Statistical analyses*		
				MD	95% CI	p-value
Until 5% of body weight volume aspiration	6.53 ± 1.09	6.2 ± 1.3 (range: 5 to 8; n= 5)	6.7 ± 1.06 (range: 5 to 8; n= 10)	-0.5	-1.82 to 0.82	0.46
Over 7% of body weight volume aspiration	6.54 ± 1.45	6.29 ± 0.5 (range: 5 to 9; n= 7)	6.83 ± 1.6 (range: 5 to 9; n= 6)	-0.54	-1.87 to 0.79	0.43

Legend: for all evaluation it was given the whole value and percentage, except: <sup>a</sup>mean value. \*The analysis is presented for the groups (patients who used Autolog *versus* the ones who didn't) and its subgroups respectively. Source: Prepared by the authors.

#### 4 DISCUSSION

Through this retrospective case-control study we had a clinically important difference among the Autolog group and Control group, which was higher aspirated volume (4881.58±2287.6ml, range: 2000-11600ml *versus* 3761.76ml±1344.38ml, range: 2000-6200ml) and body weight aspirated volume (6.78%±2.9%, range: 2.94%-11.88% *versus* 5.47%±1.77%, range: 3.47%-8.49%). We didn't find statistical significance any of our outcomes.

Liposuction is one of the most performed surgical procedures in aesthetic surgery, and one of the objectives is to minimize blood loss during the procedure. It's known that wet techniques, with fluid infusion, minimize blood loss from 20-45% to 15-30%.<sup>(10)</sup> For this, finding additional resources to enhance surgery safety and to decrease total blood loss is needed and autotransfusion might be a good resource. Besides, it has many benefits, such as having a blood supply available and compatible with the patients in case of any complications and not inducing pathological responses in the patient.<sup>(11)</sup>

A meta-analysis of washed cell salvage in patients undergoing orthopedic, cardiac, vascular, multiple trauma, cancer or pediatric surgery, observed a reduction of infection rates and of allogeneic red blood cells (RBC) by 57% in 15 trials. They reported no variation of transfusion thresholds between cell salvage and control group and recommended, due to the benefit-risk-ratio, routinely autotransfusion, independent of Hb level, for patients performing the type of surgery mentioned. Besides, length of hospital stay also reduced in auto transfused patients.<sup>(12)</sup>

The reason why Medtronic was the chosen autotransfusion device is related to a Technical Concept Paper (1999) published which evaluated wash quality.<sup>(13)</sup> It was found that Medtronic's device had a fast processing time and greater percentage washout for C4, platelets, white blood cells and packed RBC mass/min compared to BRAT 2, CATS, Sequestra 1000, cell saver and Compact A. For heparin and C3 washout Autolog tied with Sequestra1000, for PRC mass (mL) it had the lowest result,<sup>(13)</sup> and for resulting hematocrit (66-56%) it tied with OphoPAT, Sequestra and CATS.<sup>(11)</sup> In another study (2003) comparison Sequestra, BRAT 2, CATS, haemonetics and Autolog, CATS showed high hematocrit (mean 66%  $\pm$  7%,  $p < 0.05$ ), followed by Autolog when compared to Sequestra and BRAT 2 ( $p < 0.05$ ). They also observed that Haemonetics had: lower processing time of ( $p < 0.02$ ), followed by Autolog; higher RBC mass recovery rate, followed by Autolog, which was significantly better than BRAT 2 and CATS ( $p < 0.05$ ); higher heparin removal ( $p < 0.05$ ). Regarding Autolog, it had: higher plasma free hemoglobin, leukocyte and platelet removal when compared to the other devices ( $p < 0.05$ ).<sup>(14)</sup> This study does explore how Autolog can impact patients submitted to liposuction, but other devices should be tested.

As for laboratory findings and complications, Hb and serum iron had a smaller drop and platelets count increased when compared to control, both non-statistically significant findings. Another study has mentioned that in liposuction Hb falls from 2 to 6g/dL, so our findings are according to the literature.<sup>(5)</sup>

In our study we didn't have any major complications, such as mortality, venous thromboembolism, and anemia. Our rates of infection (2.78%) was according to the literature (1.5-4.27%), considering that the infection happened in a patient with combined procedures.<sup>(2,15,16)</sup> We had higher rates of seroma (69.44%) compared to other studies (2-14.38%), but they mainly involved lipoplasty associated to abdominoplasty.<sup>(3,17,18)</sup> One study inferred a 10% rate in liposuction alone<sup>(19)</sup> and one a 14.38% rate when association of abdominoplasty and sub-scarpa lipectomy.<sup>(16)</sup>

Considering bias, the analysis of the population's characteristics exposed similarity on the mean age, weight, BMI (total and subgroups) and on which procedures were associated with liposuction. One important difference noted was that patients submitted to Autolog also had higher volume and bodyweight percentage aspirated compared to control. This fact could be associated with higher confidence level by the operating surgeon while using Autolog IQ and having a patient-compatible blood supply beside the surgery bed, during the procedure. Still, the pain scale was similar among the intervention and control group. A hypothesis is that there

could have been statistical differences among groups if the aspiration would have been equal for both.

We believe this is the first study on liposuction and autologous blood supply to be performed at Latin America. As a limitation we had no literature to compare our data with and more significant analysis should be eventually performed. Besides, the few amount of participants, the non-randomized format and missing data prevented us from having a better look at patients' laboratorial outcomes.

## **5 CONCLUSION**

No significant difference was found for clinical and laboratory outcomes between the Autolog IQ and control group. However, the Autolog group had higher volume and body weight % aspirated volume, which could affect results due to heterogeneity. The few data and studies on the subject, especially associated with plastic surgery, were a limiting factor to evaluate the importance of these findings.

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## REFERENCES

1. ISAPS International Survey on Aesthetic/cosmetic procedures, performed in 2022. International Society of Aesthetics Plastic Surgery; Available at: [https://www.isaps.org/media/a0qfm4h3/isaps-global-survey\\_2022.pdf](https://www.isaps.org/media/a0qfm4h3/isaps-global-survey_2022.pdf). Accessed December 8, 2023.
2. Barros LFL, Teixeira VF, Reis Júnior JAP, Ferraz RA, Araújo DDC, Vendramin FS. Complications in liposuction: systematic review. *Braz J Plast Sugery*. 2023;38(1).
3. Sozer SO, Basaran K, Alim H. Abdominoplasty with Circumferential Liposuction: A Review of 1000 Consecutive Cases. *Plast Reconstr Surg*. 2018 Oct;142(4):891–901.
4. Montrief T, Bornstein K, Ramzy M, Koyfman A, Long B. Plastic Surgery Complications: A Review for Emergency Clinicians. *West J Emerg Med*. 2020 Sep 25;21(6).
5. Campos R, Soley NAR, Campos BVBL. Patient safety: changes in hemoglobin and serum iron after liposuction and/or abdominoplasty. *Braz J Plast Sugery*. 2018;33(4):511–7.
6. Mandel MA. Blood and fluid replacement in major liposuction procedures. *Aesthet Plast Surg*. 1990; 14(3):187-91.
7. American Society of Plastic Surgeons. Liposuction - Lipoplasty. Available at: <https://www.plasticsurgery.org/cosmetic-procedures/liposuction>. Accessed December 8, 2023.
8. Australian Society of Plastic Surgeons. Liposuction. Available at: <https://plasticsurgery.org.au/procedures/surgical-procedures/liposuction/>. Accessed December 8, 2023.
9. Brazilian Society of Plastic Surgery. Lipoaspiração - Cirurgias e Procedimentos. Available at: <http://www2.cirurgiaplastica.org.br/cirurgias-e-procedimentos/lipoaspiracao>. Accessed December 8, 2023.
10. Karmo F, Milan M, Stein S, Heinsimer J. Blood loss in major lipoplasty procedures with the tumescent technique. *Aesthet Surg J*. 1998;18(1):30–5.
11. Geiger P, Platow K, Barti A, Volk C, Junker K, Mehrkens H. New developments in autologous transfusion systems. *Anaesthesia*. 1998;53(2).
12. Meybohm P, Choorapoikayil S, Wessels A, Herrmann E, Zacharowski K, Spahn DR. Washed cell salvage in surgical patients: A review and meta-analysis of prospective randomized trials under PRISMA. *Medicine (Baltimore)*. 2016 Aug;95(31):e4490.
13. Hannon T. Medtronic autoLog® Autotransfusion System: Comparative Wash Quality and Clinical Assessment. Technical Concept Paper published by Medtronic. 1999.
14. Serrick CJ, Scholz M, Melo A, Singh O, Noel D. Quality of Red Blood Cells Using Autotransfusion Devices: A Comparative Analysis. *J Extracorpor Technol*. 2003 Mar;35(1):28–34.

15. Vieira BL, Chow I, Sinno S, Dorfman RG, Hanwright P, Gutowski KA. Is There a Limit? A Risk Assessment Model of Liposuction and Lipoaspirate Volume on Complications in Abdominoplasty. *Plast Reconstr Surg*. 2018 Apr;141(4):892–901.
16. Restifo RJ. Sub-Scarpa's Lipectomy in Abdominoplasty: An Analysis of Risks and Rewards in 723 Consecutive Patients. *Aesthet Surg J*. 2019 Aug 22;39(9):966–76.
17. Xia Y, Zhao J, Cao DS. Safety of Lipoabdominoplasty Versus Abdominoplasty: A Systematic Review and Meta-analysis. *Aesthetic Plast Surg*. 2019 Feb;43(1):167–74.
18. Wu S, Coombs DM, Gurunian R. Liposuction: Concepts, safety, and techniques in body-contouring surgery. *Cleve Clin J Med*. 2020 Jun;87(6):367–75.
19. Husain TM, Salgado CJ, Mundra LS, Perez C, AlQattan HT, Bustillo E, et al. Abdominal Etching: Surgical Technique and Outcomes. *Plast Reconstr Surg*. 2019 Apr;143(4):1051–60.