



The Role of Blood Pressure Control in Prevention of Hematoma After Blepharoplasty

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Abstract

Introduction Hematoma formation after blepharoplasty is serious and potentially vision-threatening, with hypertension being the primary risk factor. The aim of this paper is to assess perioperative blood pressure trends and rates of complication in patients undergoing a strict blood pressure protocol designed to keep perioperative systolic blood pressure below 120 mmHg.

Methods A retrospective chart review was performed of 32 patients undergoing face lift with concomitant blepharoplasty from January 2015 to July 2018. For each patient blood pressure readings obtained before, during, and after surgery were reviewed. Two-sample one-tail T-tests were performed, and p values less than 0.05 were considered statistically significant.

Results The mean systolic blood pressure (SBP) for all patients was highest intraoperatively. Patients with known hypertension had higher mean SBPs than patients without hypertension across all phases of care, with a statistically significant difference in immediate preoperative SBP ($p=0.05$). Males had a higher average blood pressure immediately postoperatively ($p=0.05$). A previous diagnosis of hypertension in females was associated with a higher immediate preoperative SBP ($p=0.07$) as well as age over 65 ($p=0.07$).

The overall rate of complications was 37.5%. No patients experienced hematoma.

Conclusion This study demonstrated that keeping blood pressure below 120 mmHg after surgery was an effective method of preventing hematoma after blepharoplasty, even in patients concurrently on anti-coagulative medications. Special attention to blood pressure control should be shown to patients with known risk factors such as a previous diagnosis of hypertension, male sex, or age greater than 65.

Level of Evidence III This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Blepharoplasty · Hypertension · Cosmetic surgery · Hematoma

Introduction

Blepharoplasty is one of the most popular cosmetic procedures performed in the USA. According to the American Society of Plastic Surgeons (ASPS), blepharoplasty was the second leading cosmetic procedure performed in 2020, with 325,112 eyelid surgeries performed [1]. Patients over the age of 55 were most likely to pursue this surgery, with 58% of total blepharoplasties performed in the 55+ age group cohort. Similarly, the Aesthetic Society found that blepharoplasties was the most common surgery in women over the age of 71 and the third most common sought after surgical procedure in men. They cited that in 2022, 104,214 blepharoplasties were counted garnering over \$350,000,000 in the year [2].

Blepharoplasty has few complications, but some can be serious and even vision-threatening. One of the most feared complications of blepharoplasty is hematoma. Mild

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hematomas may be treated conservatively with ice compresses but in severe cases may result in tissue fibrosis, lid scarring and retraction [3]. There have been many reports of permanent visual loss due to severe retrobulbar hematoma after blepharoplasty [4–6]. Retrobulbar hematoma can be an early or late post-operative complication, although most commonly presents in the immediate post-operative period [7].

As the US population ages and cardiovascular disease (CVD) prevalence increases, more and more cosmetic patients are on anti-hypertensive and anti-coagulative therapy, increasing the risk of hematoma. One large study noted 40% of patients on at least one antithrombotic agent [8]. Discontinuing anticoagulants for eyelid surgery may carry risk, therefore it is crucial to find an alternative method of preventing hematoma formation postoperatively. The CDC reported that in 2018, nearly 55% of all adults ages 40–59, and nearly 75% of all adults 60 and over were diagnosed with hypertension [9]. Hypertension is the primary risk factor for hematoma formation in cosmetic surgery. Other predisposing factors include NSAID, aspirin therapy, lower eyelid blepharoplasty, and extensive resection of the orbicularis muscle [10, 11]. As hypertension is the primary risk factor and manageable in the perioperative period, controlling hypertension provides an excellent target for hematoma prevention.

A previous ASJ publication by Bassiri et al. described an ultra-strict systolic blood pressure protocol designed to maintain perioperative systolic blood pressure below 120 mmHg after facelift with a successful reduction in post-op hematoma [12]. The aim of this paper is to assess perioperative blood pressure trends and rates of complication in different blepharoplasty patient cohorts undergoing the same strict blood pressure control protocol.

Methods

Inclusion criteria were patients who underwent face lift by this surgeon from January of 2015 to July of 2018 with concomitant upper lid blepharoplasty, using this ultra-strict intra-operative blood pressure control method. Exclusion criteria were patients who did not undergo concomitant blepharoplasty.

A retrospective chart review was performed of 85 patients undergoing face lift procedures by a single surgeon between January of 2015 and July of 2018. From these 85 patients, 32 were identified as undergoing concomitant upper blepharoplasty. During the blepharoplasty, fat pads were resected and orbicularis was resected when indicated. No pressure dressings were used after the procedure. For each patient four blood pressure readings were reviewed before, during, and after surgery: 1) pre-operatively in

clinic, 2) immediately before surgery, 3) immediately after surgery in the PACU, and 4) postoperatively in clinic. Both systolic and diastolic pressures were continuously recorded and monitored, and average pressures across the time span were used in this study. Additionally intra-operative systolic maximums were reviewed.

Blood pressure control was achieved intra-operatively using clonidine as the preferred medication, with a goal of 120/80. Adrenaline and other medications were not used. There was no difference in patient management with respect to their post-operative blood pressure levels.

Primary outcome for this study was incidence of hematoma, and average blood pressure trends pre-, intra-, and postoperatively. Secondary outcomes included incidence of other complications. Quality of life was not a measured outcome in this study.

Patient demographics, comorbidities, and surgical complications were reviewed. Two-sample one-tail T-tests were performed assuming equal variance for subgroup analyses, and p values less than 0.05 were considered statistically significant.

Results

The average age of this cohort was 64.1 and the average BMI 24.2 ($n=85$). Of these, 6.3% patients smoked, 18.8% were males, and 34.4% carried a previous diagnosis of hypertension. 40.6% had a psychiatric history (overwhelming majority of which was depression), 18.8% had a history of thyroid disease, and 3.1% had a history of diabetes. In terms of coagulopathic variables, 9.4% of these patients had a history of cancer diagnosis, and 6.3% had various forms of coagulopathy and were on anticoagulants at the time of surgery (Table 1).

The mean systolic blood pressure (SBP) overall for all patients preoperatively in clinic was 122 mmHg (standard deviation 14.6), immediately preoperatively 114.8 mmHg (23.4), immediately postoperatively 100.2 mmHg (11.5),

Table 1 Demographics of all patients included in the study ($n=85$)

Demographics	
Age	64.125
BMI	24.2
Smoker	6.25%
Male	18.80%
HTN	34.38%
DM	3.13%
Psych Hx	40.63%
Thyroid	18.75%
Cancer	9.38%
Coagulopathy	6.35%

Table 2 Summary of perioperative blood pressure measurements across patient cohorts

	Clinic Pre-op	Pre-op	Post-op	Clinic post-op	Intraop Max
All Patients (<i>n</i> =32)	122 (+/- 14.6)	114.8 (+/-23.4)	100.2 (+/- 11.5)	128.3 (+/-18.1)	142.9 (+/- 30.4)
With HTN (<i>n</i> =11)	122.5(+/-12.7)	124 (+/- 10.6)	102.2 (+/- 10)	130.4 (+/- 19.4)	150.4 (+/- 19.4)
Without HTN (<i>n</i> =21)	121.7 (+/-15.7)	110 (+/-26.9)	99.2(+/-12.3)	127.1 (+/- 17.9)	139 (+/- 25.4)
Males (<i>n</i> =6)	119.1 (+/-16.9)	117.1 (+/- 9.6)	107.2 (+/- 9.1)	128.2 (+/- 24.6)	153.7 (+/-53.9)
Females (<i>n</i> =26)	122.7(+/-14.3)	114.2 (+/-29.7)	98.6 (+/- 11.6)	128.3 (+/- 16.9)	140.5 (+/- 23.1)

Table 3 Overall complications and incidence of major and minor complications across all patients (*n*=85)

Complications	Incidence
Orbital	15.63%
Major	3.13%
Lid malposition	9.40%
DVT	3.13%
Hematoma	0.00%
Neuropraxia	6.25%

and postoperatively in clinic 128.3 mmHg (18.1). Additionally, the average maximum SBP reached intraoperatively was 142.9 mmHg (30.4) (Table 2).

In subgroup analysis by comorbidity, patients with a previous diagnosis of hypertension were shown to have higher mean SBPs than patients without hypertension across all phases of care, with a statistically significant difference in immediate preoperative SBP ($p=0.05$).

Subgroup analysis by gender revealed no differences in blood pressure between males and females across most phases of care, with the exception of SBPs measured in the immediate post-operative period, in which males were found to have a higher average blood pressure ($p=0.05$).

A previous diagnosis of hypertension in females was associated with a higher immediate preoperative SBP when compared to females with no previous diagnosis ($p=0.07$). Additionally, age over 65 was associated with a higher immediate preoperative SBP when compared to age under 65 ($p=0.07$). None of our patients experienced hematoma. One patient had a previous history of DVT and experienced a post-operative DVT in our hypertensive patient group. All other minor complications were resolved. There were some minor orbital complications including three instances of lid malposition and one instance of bilateral upper lid wound dehiscence. There was one instance of lagophthalmos requiring temporary tarsorrhaphy which occurred in a patient with no previously known medical history (Table 3).

Discussion

Blood pressure as a factor in the development of hematoma formation after surgery has been long recognized, initially in association with facelift in the 1970s. It is recommended

that patients with known uncontrolled hypertension not undergo blepharoplasty due to increased risk of vision-threatening hematoma [13]. Additionally, patients who undergo blepharoplasty, strict blood pressure control is recommended in the intra-operative and post-operative period [13]. There are several proposed thresholds for treating perioperative blood pressure, including 130 mmHg, 140 mmHg, 150 mmHg, and more recently, 120 mmHg [12, 14]. This study found no instances of hematoma in patients undergoing this ultra-strict blood pressure protocol aimed at keeping post-operative blood pressure below 120 mmHg. In fact, the average post-operative blood pressure of this cohort was 110 mmHg and there were no reported hematoma.

Previous studies have shown that preoperative outpatient blood pressure variability predicts post-operative mortality, readmission, and morbidity after cardiac surgery [15]. Patients previously diagnosed with hypertension, male sex, and patients over 65 are most at risk for perioperative increased pressures. Our study supports these findings, highlighting these groups as ones who would benefit from more strict blood pressure monitoring and intervention in the perioperative period. Additionally, patients who are on preventative anti-coagulopathic therapy would benefit from this monitoring as they are at a higher risk of hematoma development.

There is some evidence supporting the thought that patients over the age of 60 experience increased risk of bleeding on fluoxetine [16]. Given that 40.6% of our patients had a documented psychiatric history, with most, if not all diagnosed with depression or on anti-depression therapy, and 58% of blepharoplasties in the USA are performed in the over 55 age group, this risk is particularly relevant in the population undergoing blepharoplasty [1, 2]. As emotional health is of the utmost importance, especially in the perioperative period when patients are experiencing the stress and emotions surrounding surgery and surgical recovery, it would be difficult to advocate for discontinuing SSRIs during surgery. Strictly monitoring perioperative blood pressure provides a realistic alternative to prevent hematoma without disturbing a patient's emotional health care plan.

Other methods currently recommended for decreasing complications after blepharoplasty include post-operative eyelid cooling for 24 hours after surgery. One randomized controlled observer-blinded study investigating post-operative cooling of eyelids after upper blepharoplasty found that this intervention did not affect post-operative erythema, edema, or hematoma [17]. Additionally, in this study the majority of patients indicated that they preferred not to cool the eyelids after blepharoplasty. Strictly controlling perioperative blood pressure provides an agreeable alternative to post-operative cooling that has the potential to decrease rates of hematoma while keeping patients satisfied with their experience.

Limitations

Our study has limitations inherent to retrospective reviews, including selection bias in defining our cohort of patients. There were also no controls, no historic controls for comparison in our practice. Another significant limitation of this study was the small sample size. A larger cohort would be helpful in determining true incidence of complications in blepharoplasty performed with this ultra-strict blood pressure protocol. Additionally, this cohort of patients had blepharoplasty performed in conjunction with rhytidectomy. Further research is needed on strict blood pressure control and perioperative blood pressure trends in patients undergoing blepharoplasty alone, and we believe a prospective study with strict inclusion criteria would be of value.

Conclusion

Hematoma is one of the most feared complications of blepharoplasty, with severe cases potentially threatening vision. This study demonstrated that keeping blood pressure below 120 mmHg after surgery was an effective method of preventing hematoma after blepharoplasty, even in patients concurrently on anti-coagulative medications. Additionally, we showed that the greatest variance in blood pressures between groups occurred in the immediate pre-operative period. Special attention to blood pressure control should be shown to patients with known risk factors such as a previous diagnosis of hypertension, male sex, or age greater than 65. Further studies with larger sample sizes are needed to corroborate these findings.

Declarations

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

Ethical approval This article did not require IRB approval due to the use of deidentified patient data which had been previously collected and deidentified for a prior, IRB-approved, published study.

Informed consent For this type of study, informed consent is not required.

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