

Incidence and Outcomes of Thromboembolic Events in Plastic Surgery Infirmiry Patients

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Abstract

Venous thromboembolism (VTE) is a major public health concern. To minimize the incidence of perioperative venous thromboembolism, risk assessment and prevention are essential. This study was designed to assess the frequency and result of VTE episodes in a cosmetic surgery facility, as well as to establish if good practices were followed. Recently, the American Association of Plastic Surgeons conducted a thorough survey and meta-study of venous thromboembolism risk delineation, as well as the hazards and advantages of chemoprophylaxis in the plastic surgical treatment population

Keywords: Thromboembolic • Events • Plastic surgery • Hypertension • Prophylaxis

Introduction

Venous thromboembolism (VTE) is a serious public health reality and a threat to the safety of plastic surgery patients. It is frightening because even though it is estimated that half of all surgery-associated DVT will resolve themselves spontaneously (generally within 3 days), they can strike quickly and be fatal. A study revealed that among patients, who presented symptomatic Pulmonary Embolism (PE), 10% would die within 60 minutes and 5% of patients with PE developed cardiac dysfunction [1]. The exact incidence of VTE in the plastic surgery population is unknown, but there is relevant data indicating it's prevalence, with a significantly large study by Grazer and de Jong that isolated PE as the single largest cause of mortality in patients receiving liposuction [2]. Another study, by Bucknor and Egeler, verified that PE was the main cause of death in over one million office-based plastic surgery patients, and that event was most commonly associated with abdominoplasty [3]. For instance, cases number 2 and 6 had modifiable risk factors that were not addressed before surgery, in cases 4 and 5, the prophylaxis was done with 20 mg LMWH, the incorrect dosage. In cases 7, 8 and 9 (Head and Neck Oncological surgical patients), all with Caprini score of 3 or above, LMWH should have been considered. This is a recommendation rated as Grade B evidence by the ASPS guidelines, meaning that, 'Clinicians should follow a recommendation but should remain alert to new information and sensitive to patient preferences'. And even though physician judgment determines the final care received by the patient, if the decision is not done accordingly to international recommendations, then there must be a reasonable rationale to that decision in clinical records. A possible explanation to this data, namely lack of attention to VTE prevention by plastic surgeons, may be that these are mainly focused on the surgery; the patient is the surgery, which has steps and techniques to follow. And might sometimes disregard or neglect other aspects of operative care, such as preoperative antibiotic prophylaxis, the patient's diseases, medication, etc. Maybe some expect the anaesthesiologist will cover those items. However, often that is not the case and the patient is the plastic surgeons' responsibility, that must

be cared has a whole; if it does have diabetes, is it under control? Hypertension is under control or it is necessary medication adjustment? In addition, patients are often seen by different specialists or residents in major hospitals, which is a quite different form private practice. In fact, abdominoplasty consistently presented the highest published rates of DVT and PE in plastic surgery, Van Uchelen et al reported a 1.4% incidence [4], and Grazer and Goldwyn showed a 1.2% incidence of DVT and 0.8% of PE [5].

With this in mind in 2009, The American Society of Plastic Surgeons (ASPS) convened a Venous Thromboembolism Task Force and published its official guidelines in 2012 [6]. Recently, the American Association of Plastic Surgeons performed a systematic review and meta-analysis of venous thromboembolism risk stratification and the risks and benefits of chemoprophylaxis specific to the plastic surgery population [7]. They recommended to assess the risk of VTE to all surgical patients and recorded it in the clinical process. The 2005 Caprini Risk Factor Thrombosis score [8] has been the most widely used and well-validated individualized risk-stratification tool, and is endorsed by both the American Society of Plastic Surgeons and the American Association of Plastic Surgeons for use, even though it presents its own limitations [9]. Taking in consideration the VTE risks (Caprini score, the procedure itself and clinical judgment) two relevant decisions should be pondered: delay surgery so that risk can be reduced (stopping medication, lower body weight, hematologic consultation) and use measures to actively prevent (Chemoprophylaxis). Regarding active prevention, mechanical devices are generally safe, little harm can be made with their use, and its application is recommended whenever possible, being sequential compression devices preferred over elastic compression stockings [10]. Chemoprophylaxis on the other hand may increase bleeding. In most cases the chemoprophylaxis should be done with low molecular weight heparin (LMWH) 40 mg and started 6-12 hours after surgery. Despite many studies demonstrating the importance of VTE, that prevention is the most effective strategy to minimizing morbidity and mortality and that chemoprophylaxis is benefit, plastic surgeons continue to devalue this topic and underuse chemoprophylaxis [11-16]. The objective of this work is to find information that can help to clarify the importance of VTE in plastic surgery and if the recommended means of prevention are being employed.

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Literature Review

This article provides insights on the VTE statistics of a Plastic and Reconstructive Surgery department at a major hospital in Portugal. We believe it might indicate a similar pattern across other hospitals

in the country and possibly in Europe and Worldwide. A rate of VTE in inpatient population of 0.09% is overall good, and a rate of 0.17% in abdominoplasty patients is in line with the literature 4,5,15 as is also the incidence in head and neck cancer of 0.9%. However the fact that two thirds of the patients had an event that was potentially preventable is frightening and highlight deficits in VTE risk assessment and prophylaxis. However, a VTE event can be real and catastrophic, leading to (maybe, a preventable) death. The Hospital, where the data for this study came from, had recently implemented changes regarding VTE prevention, which included the possibility of VTE risk assessment by using the Caprini score through a computer application that after the score is calculated, it offers prevention options (including mechanical and/or LMWH) to be included in the prescription. Also on the safe surgery checklist, it is currently assessed if VTE prophylaxis was or will be done.

There are some limitations in this study that are important to address. First, it is a retrospective study with a relatively reduced sample size based on only one hospital database. Second, statistics here presented may underestimate events and there is the theoretical risk that a VTE event may have not been reported, because data quality is limited by the accuracy of the individual entering it in database, or the event was not diagnosed (we believe it to be the case of what happened on the first postoperative day in case number 2). Also, there were not full medical records available for all cases, limiting a better comprehensive analysis.

Also of note, is the fact that surgeries involved were considered high risk surgeries for a VTE10: abdominoplasty, breast reconstruction and head/neck oncologic surgery?

The importance of preoperative VTE risk assessment is well known, however, the application of prevention modalities is inconsistently done. In our report no VTE risk assessment was performed to any of the 9 patients and prevention measures did not correlate with medical knowledge. For instance, cases number 2 and 6 had modifiable risk factors that were not addressed before surgery, in cases 4 and 5, the prophylaxis was done with 20 mg LMWH, the incorrect dosage. In cases 7, 8 and 9 (Head and Neck Oncological surgical patients), all with Caprini score of 3 or above, LMWH should have been considered. This is a recommendation rated as Grade B evidence by the ASPS guidelines, meaning that, 'Clinicians should follow a recommendation but should remain alert to new information and sensitive to patient preferences'. And even though physician judgment determines the final care received by the patient, if the decision is not done accordingly to international recommendations, then there must be a reasonable rational to that decision in clinical records. A possible explanation to this data, namely lack of attention to VTE prevention by plastic surgeons, may be that these are mainly focused on the surgery; the patient is the surgery, which has steps and techniques to follow. And might sometimes disregard or neglect other aspects of operative care, such as preoperative antibiotic prophylaxis, the patient's diseases, medication, etc. Maybe some expect the anaesthesiologist will cover those items. However, often that is not the case and the patient is the plastic surgeons' responsibility, that must be cared as a whole; if it does have diabetes, is it under control? Hypertension is under control or it is necessary medication adjustment? In addition, patients are often seen by different specialists or residents in major hospitals, which is a quite different from private practice. Lucky, VTE events are rare in the plastic surgeons' practice, and many cases are asymptomatic, so many surgeons see VTE as a "unicorn", something never saw and hopefully never will. However, a VTE event can be real and catastrophic, leading to (maybe, a preventable) death. The Hospital, where the data for this study came from, had recently implemented changes regarding VTE prevention, which included the possibility of VTE risk assessment by using the Caprini score through a computer application that after the score is calculated, it offers prevention options (including mechanical and/or LMWH) to be included in the prescription. Also on the safe surgery checklist, it is currently assessed if VTE prophylaxis was or will be done.

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Results

Of the 10473 patients treated in our department from 2006 to the end of 2015, patients had been diagnosed with a VTE event (rate of 0.09%), 6 presented PE and 3 suffered DVT. 1728 abdominoplasties were made during that period. 338 head and neck cancer patients and 506 breast cancer patients were admitted in the infirmary during the 10 year period. Data for these 9 patients was retrieved, with 8 being female and 1 male, with a mean age of 60 (range, 46–84 years). Mean pre-operatively Caprini score was 6.89 (Standard deviation (SD) ± 3.79) - selected patients, the VTE event occurred after abdominoplasty in 4 cases, and 3 of them were operated at our hospital (incidence rate: 0.17%). 3 other cases were related to head and neck cancer patients (incidence rate: 0.9%) and 1 case in a breast reconstruction case (incidence rate 0.2%). VTE mortality rate was 0% over the following ten years. All patients survived and are alive with no permanent damage from the VTE. Regarding VTE assessment and prophylaxis, no patient had a record of the calculated Caprini score, and only three had done the recommended prophylaxis (40 mg LMWH). No documented formal VTE preoperative assessment was undertaken. In addition, no patient wore compression socks neither sequential compression devices (Table 1).

Table 1. Overall patients from all diagnosed diseases.

Total No. of Patients	Diagnosed Disease	2006-2015 Rate of Percentage and Year	Age of Patients
10743	DVT and PE	0.09% Range	-----
1728	Head and Neck Cancer & Breast Cancer	10 Years Range	-----
18	Other Cancer Patients	60% Range	46-48 Years

Assessment of case 2

53 years old patient, with a personal history of: DVT, uterus and breast cancer, medicated with an aromatase inhibitor (Anastrozol), severe bilateral venous insufficiency already waiting for surgical treatment and using compression stockings.

The patient was submitted to a deferred breast reconstruction with Transverse Rectus Abdominis Musculocutaneous Flap (TRAM). On the first postoperative day, the patient was found in hypotimia, with hypotension and respiratory insufficiency. The Doctor that assessed the patient, assumed the symptoms to be related with acute anaemia (dropped from 14, 6 grams per decilitre (g/dL) to 9.8g/dL), and submitted the patient to a blood transfusion. However, one month later, the patient was found dyspnoeic and with thoracic pain and a CT scan revealed PE on segmental branches of the left-lower-lobe pulmonary artery. Echocardiogram did not reveal significant alteration. Doppler ultrasound of the inferior, superior members and cervical did not reveal signs of DVT. The patient completed 6 months of hypocoagulation and shortly after was submitted to the venous surgery.

Comment: According to ASPS recommendations 6, all patients that are to be subject to an elective surgery, like a deferred breast reconstruction, should address all modifiable risk factors. This patient

should have done a venous surgery and complete the treatment with the aromatase inhibitor before breast surgery being undertaken. Also, a patient with a very high Caprini scores must be clarified of the high risks for a VTE event, and be given the adequate time to reflect and decide to follow through or not with surgery.

Assessment of abdominoplasty cases (3, 4, 5 and 6)

Case number 3: A female 62 years old patient, that was a smoker and suffered from chronic respiratory insufficiency, had a moderated aortic valve stenosis with no biventricular dysfunction and a 3-month history of lower limb edema from an unknown cause, developed dyspnoea and thoracic pain two days after surgery. A Computed Tomography (CT) scan revealed a PE on the left pulmonary artery. He was kept for 3 days in an intermediate care unit with oxygen support and heparin perfusion, no DVT was found in the Doppler ultrasound and also no new cardiac dysfunction on echocardiogram. The patient was kept on hypocoagulation and 3 years later replaced the aortic valve.

Case number 4: The patient corresponding to case number 4 was discharged on post-operative day one after an abdominoplasty. Three days later, the patient returned to hospital complaining of sudden pain in her leg. A Doppler ultrasound revealed a DVT. The patient was admitted in the infirmary for surveillance and medicated with LMWH 60 mg 12/12 hours or more than that compression socks. After 13 days of surveillance she was discharged and was readmitted 23 days after surgery, due to an abdominal hematoma. She was operated with no further complication. She was kept on hypocoagulation for 6 months and latter submitted to surgery for venous insufficiency.

Case number 5: On the first day after surgery, the patient was presented with syncope, in shock and with type 1 respiratory failure. D-Dimers were elevated, and a CT scan revealed a massive PE. Echocardiogram revealed enlargement of right heart and acinetic right ventricular wall. Because of the haemorrhagic risk, thrombolysis was not done; patient remained in intensive care with non-invasive ventilation, heparin perfusion and amine support for 4 days. She recovered and survived with no permanent damage accounted for.

Comment: Regarding cases 4 and 5, prophylaxis was done with 20 mg LMWH, which is only advocated in cases of renal insufficiency, low platelets count or extremely low weight 13,14, which none of the patients presented. So, it should have been administered 40 mg 10.

Case number 6: The patient number 6 was a 54 years old female, with a body mass index (BMI) of 33 kg/m² and chronic obstructive pulmonary disease. On the first postoperative day, the patient was found in acute respiratory distress. Elevated D-Dimers were present and a CT scan revealed PE on segmented branches of the left-lower-lobe pulmonary artery. The patient stayed in an intermediate care unit with oxygen support and heparin perfusion for 4 days. She completed 6 months of hypocoagulation and no permanent damage was found.

Comment: Again, according to ASPS recommendations 6, all patients that are to be subject to an elective surgery, should solve all modifiable risk factors. This patient should have lost weight before surgery.

Assessment of Head/Neck Oncological patients cases (7, 8 and 9)

Case number 7 and 8: The case number 8 was related to a patient that, already at the operating table, was found with an edematous leg, leading to the surgery cancelation. A Doppler ultrasound confirmed a DVT on the left iliac femoral artery. The patient completed 6 months of hypocoagulation and used compression stockings.

Case number 9: The patient corresponding to case number 9 had an oral epidermoid carcinoma. The patient was tracheostomized, submitted to segmental mandibulectomy, partial glossectomy, bilateral neck

dissection and reconstruction with a local flap. Soon after radiotherapy was initiated, an oral cutaneous fistula developed and the patient was readmitted for reconstruction with a pectoralis major Myocutaneous flap. During recovery the patient developed a respiratory infection. He was under prophylaxis with LMWH for 24 days postoperatively, however, it stopped for unknown reasons and one week after, the patient suffered a DVT documented on a Doppler ultrasound. He completed 3 months of hypo coagulation.

Comment: There are no current standard guidelines for chemoprophylaxis duration in plastic surgery patients, but it is advisable its continuation during inpatient stay, especially when the patient is still recovering and not ambulatory.

Discussion

In this retrospective study, we collected from the Hospital Database and Statistics (through the hospital codification system) the number of patients that were admitted to the Plastic Surgery infirmary of Hospital São João, Porto, Portugal, from 2006 to 2015. We then searched in these patients, through the codification that is the same of the International Classification of Diseases, Ninth Revision (ICD-9). Then we selected the patients that had been diagnosed with DVT (453.4 - Acute venous embolism and thrombosis of deep vessels of lower extremity Or 453.8 - Acute venous embolism and thrombosis of other specified veins) and/or PE (415.1 - Pulmonary embolism and infarction). We discharged those that did not had full medical records available, had thrombosis following a vascular anastomosis, following vascular injury (either traumatic or related to surgery, like thrombosis of a jugular vein following a cervical abscess or hematoma). Of those that met the criteria, medical records were reviewed and specific data was collected: age, gender, surgery or main diagnosis, day of the event, the Caprini score calculated based on the pre surgery records and what means of prophylaxis were employed. We then collect the total number of patients that had been submitted to: abdominoplasty (diagnosis coded 278.1 Localized adiposity and procedures 83.65 Other suture of muscle or fascia plus 86.72 Advancement Of Pedicle Graft); Head and neck cancer patients (diagnosis coded 140-149 Malignant Neoplasm Of Lip, Oral Cavity, And Pharynx, 160 Malignant neoplasm of nasal cavities middle ear and accessory sinuses, 161 Malignant neoplasm of larynx, 170.0 Malignant neoplasm of bones of skull and face, except mandible, 170.1 Malignant neoplasm of mandible, 171.0 Malignant neoplasm of connective and other soft tissue of head, face, and neck, 172.0 Malignant melanoma of skin of lip, 172.1 Malignant melanoma of skin of eyelid, including canthus, 172.2 Malignant melanoma of skin of ear and external auditory canal, 172.3 Malignant melanoma of skin of other and unspecified parts of face, 172.4 Malignant melanoma of skin of scalp and neck, 173.0 Oth and unspec malignant neoplasm of skin of lip, 173.1 Oth and unspec malignant neoplasm of eyelid, including canthus, 173.2 Oth and unspec malignant neoplasm of skin of ear and external auditory canal, 173.3 Oth and unspec malignant neoplasm of skin of oth and unspec parts of face, 173.4 Oth and unspec malignant neoplasm of scalp and skin of neck, 190 Malignant neoplasm of eye, 191 Malignant neoplasm of brain) and breast cancer patients (V10.3 Personal history of malignant neoplasm of breast, V51 Aftercare involving the use of plastic surgery, 174 Malignant neoplasm of female breast, 175 Malignant neoplasm of male breast, 198.81 Secondary malignant neoplasm of breast, 233.0 Carcinoma in situ of breast, 238.3 Neoplasm of uncertain behavior of breast, 612 Deformity and disproportion of reconstructed breast). The study was conducted according to the principles of the Declaration of Helsinki. Data was collated in a Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA) and statistical analysis was performed using SPSS version 13 for Windows (SPSS Inc. Chicago, IL). Statistical significance was considered at a probability of p-value <0.05.

Conclusion

This article discusses the VTE data of a Plastic and Reconstructive Surgery department at a large Portuguese hospital. We believe it may be indicative of a similar tendency at other hospitals across the country, as well as in Europe and around the world. A VTE rate of 0.09 percent in the inpatient population is considered acceptable, and a rate of 0.17 percent in abdominoplasty patients is consistent with the literature. As is the 0.9 percent incidence of head and neck cancer 16. However, the fact that two-thirds of the patients experienced a potentially avoidable event is concerning and highlights gaps in VTE risk assessment and prevention. It's also worth noting that the procedures involved were all deemed high-risk for a VTE10: abdominoplasty, breast reconstruction, and head/neck oncologic surgery. Although the relevance of preoperative VTE risk assessment is generally understood, the use of preventive measures is uneven. No VTE risk assessment was conducted on any of the 9 patients in our report, and preventive actions did not correspond with medical knowledge. Fortunately, VTE episodes are uncommon in the practice of plastic surgeons, and many instances are asymptomatic, thus many surgeons witness VT.

References

1. Kearon, Clive. "Natural History of Venous Thromboembolism." *Circulation* 107 (2003): 122-30.
2. Grazer, F M and Jong de R H "Fatal Outcomes From Liposuction: Census Survey of Cosmetic Surgeons." *Plast Reconstr Surg* 105(2000): 436-446.
3. Keyes, Geoffrey R, Singer Robert, Iverson Ronald E and McGuire Michael, et al. "Mortality in Outpatient Surgery." *Plast Reconstr Surg* 122 (2008): 245-250.
4. H Jeoren, Uchelen Van, Werker Paul MN and Mosie Kon. "Complications of Abdominoplasty in 86 patients." *Plast Reconstr Surg* 107 (2001): 1869-1873.
5. Grazer, F M, and Goldwyn R M. "Abdominoplasty assessed by survey, with emphasis on complications." *Plast Reconstr Surg* 59 (1977): 513-517.
6. Murphy, Robert X Jr, Alderman Amy, Gutowski Karol, and Kerrigan Carolyn, et al. "Evidence Based Practices for Thromboembolism Prevention: Summary of the ASPS Venous Thromboembolism Task Force Report." *Plast Reconstr Surg* 130 (2012): 168-175.
7. Pannucci, Christopher J, John MacDonald K, Stephan Ariyan, and Karol Gutowski A, et al. "Benefits and Risks of Prophylaxis for Deep Venous Thrombosis and Pulmonary Embolus in Plastic Surgery: A Systematic Review and Meta-Analysis of Controlled Trials and Consensus Conference." *Plast Reconstr Surg* 137 (2016): 709-730.
8. Joseph, Caprini A. "Thrombosis Risk Assessment As A Guide To Quality Patient Care." *Dis Mon* 51 (2005): 70-78.
9. Swanson, Eric. "Risk Stratification, and Rivaroxaban in Plastic Surgery: Time to Reconsider Our Strategy." *Plast Reconstr Surg Glob Open* 4 (2016): 733.
10. Pannucci, J Christopher. "Evidence-Based Recipes for Venous Thromboembolism Prophylaxis: A Practical Safety Guide." *Plastic and Reconstructive Surg* 139 (2017): 520-532.
11. Arnold, D M, Kahn S R, and Shrier I. "Missed Opportunities for Prevention of Venous Thromboembolism: An Evaluation of The Use of Thromboprophylaxis Guidelines." *Chest* 120 (2001): 1964-1971.
12. J Christopher, Pannucci, George Dreszer, Fisher Wachtman Christine, and Steven Bailey H, et al. "Postoperative enoxaparin prevents symptomatic venous thromboembolism in high-risk plastic surgery patients." *Plast Reconstr Surg* 128 (2011): 1093-1103.
13. Garcia, David A, Baglin Trevor P, Weitz jeffrey I and Samama Meyer Michel. "Parenteral anticoagulants: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines." *Chest* 141 (2012): 245-435.
14. Carrier, M, Khorana AA, Zwicker J I, Noble S and Lee AYY et al. "Management of challenging cases of patients with cancer-associated thrombosis including recurrent thrombosis and bleeding: guidance from the SSC of the ISTH." *J Thromb Haemost* 11 (2013): 1760-5.
15. Amy, Alderman K, Dale Collins E, Rachel Streu and Grotting James Gottering C, et al. "Benchmarking outcomes in plastic surgery: national complication rates for abdominoplasty and breast augmentation." *Plast Reconstr Surg* 124 (2009): 2127-33.
16. Haen, Pierre, Mege Diane, Crescence Lydie and Dignat-George Françoise, et al. "Thrombosis Risk Associated with Head and Neck Cancer: A Review." *Int J Mol Sci* 20 (2019): 2838.

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