ID Design 2012/DOOEL Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences. 2017 Jun 15; 5(3):295-298.
https://doi.org/10.3889/oamjms.2017.062
eISSN: 1857-9655
Clinical Science

New Surgical Technologies Could Facilitate Surgical Hemostasis in Hemophilic Patients

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Citation: Panovski MJ, Fildishevski IV, Ognjenovic LL, Dejanova-Ilijevska VI. New Surgical Technologies Could Facilitate Surgical Hemostasis in Hemophilic Patients. Open Access Maced J Med Sci. 2017 Jun 15; 5(3):295-298. https://doi.org/10.3889/oamjms.2017.062

Keywords: Haemophilia; surgical hemostasis; Perioperative outcome; advanced bipolar technologies; Factor supply.

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Received: 08-Mar-2017; **Revised:** 02-Apr-2017; **Accepted:** 05-Apr-2017; **Online first:** 25-May-2017

Funding: This research did not receive any financial support.

Competing Interests: The authors have declared that no competing interests exist.

Abstract

BACKGROUND: It's assumed that surgery in haemophilia can be accomplished these days safely.

AIM: The aim of this study was to investigate the influence of new surgical technologies in the perioperative management and outcome of surgical procedures in haemophiliacs.

METHODS: Two patients with mild haemophilia A underwent surgery (laparoscopic appendectomy and inguinal hernia repair). In both patients, the replacement therapy, with factor VIII, started 30 min before surgery. We used the available surgical technologies and techniques with a proven value in the best clinical practice, to achieve proper and permanent hemostasis. Postoperatively, the replacement therapy and thromboembolic prophylaxis was continued according to the international guidelines for the management of haemophilia.

RESULTS: The operative and post-operative periods were uneventful. No significant differences were found in the operation time in our hemophilic patients versus non-hemophilic patients. Significant differences related to the hospital stay duration were found in both patients compared with controls, due to the necessary replacement therapy.

CONCLUSION: With new surgical technologies, proper and permanent hemostasis can be achieved, without prolonging the operation time.

Introduction

A better understanding of the clotting mechanisms and the ability to manufacture factor concentrates have enabled the performance of more and major surgical procedures in hemophilic patients, even in patients with inhibitors [1-3]. It is assumed that surgery in haemophilia can be safely accomplished these days, if a specialised team approach, hospital capable of supporting intense factor concentrate use and timely laboratory monitoring are insured [4]. The surgical technique is the second most important part of the treatment of hemophilic patients and should provide proper and permanent hemostasis to prevent unnecessary blood loss, additional replacement therapy and to avoid postoperative wound healing complications. The conventional surgery preferred meticulous hemostasis using ligation for all visible bleeding and cautery only for capillary bleeding, at the same time trying to keep the operative time to a minimum [1, 5, 6]. Some surgeons recommend the use of topical hemostatic agents and fibrin sealants during orthopaedic procedures in patients with inhibitors [2], others recommend surgeons always to have fibrin glue and chitosan-based dressings by their side [7]. In the literature, there is a lack of data on the use of an advanced bipolar technology in surgical procedures in hemophilic patients.

The aim of this study was to investigate the influence of new surgical technologies in the perioperative management and outcome of surgical procedures in haemophiliacs.

Material and Methods

Two patients with mild haemophilia A underwent surgery in our clinic. The first patient was a 64-year-old male patient, with a history of painful

inguinal hernia and episodes of incarceration solved with taxis and a past history of hepatitis C. The second patient was a 46-year- old male patient, with a history and clinical findings of acute appendicitis from the previous day, sent to our clinic from the local hospital. The planning and preoperative preparation was performed in collaboration with the treatment team from the National Center for Hemophilia. The preoperative factor VIII level was 20% in the first and 15% in the second patient and the presence of an inhibitor was excluded. The desired preoperative factor VIII level was achieved with a 30 min. Infusion of factor VIII before surgery, according to the standardised formula. The postoperative plasma factor level and duration of administration were maintained according to the international guidelines for the management of haemophilia. In the postoperative period, thromboembolic prophylaxis with enoxaparin was given according to the laboratory test results.

Incision of the skin, in both patients, was done with electrosurgery, needle electrode and pure cut mode. Incision of the subcutaneous tissue in the first patient was done with a Valleylab™ mode, and any vascularized tissue and vessel, including subcutaneous tissue, cremaster muscle and hernia sac were dissected, sealed and cut with a LigaSure™ 5 mm instrument (ValleyLab, Inc., Covidien, Medtronic, Boulder, Colorado, USA). In the first patient, the inguinal hernia repair was performed according to the Lichtenstein technique. In the second patient, a laparoscopic access was obtained with three ports (5, 10 and 12 mm) of VersaStep™ PLUS, a radially expandable access system (Covidien, Medtronic, Mansfield, MA, USA). Intraoperatively, a gangrenous appendicitis with a local peritonitis was found. The mesoappendix was dissected, sealed and cut with a LigaSure™ 5 mm instrument. The confluence of the appendix and cecum was stapled with Endo GIA™ 30 mm reload with a Tri-Staple™ technology (Covidien, Medtronic, Mansfield, MA, USA). After a local lavage, an abdominal drain was inserted through a 12mm port access. During the operative period, blood loss, operative time and operative cost were measured. In the postoperative period, the plasma factor level, the presence of any sign of bleeding, other postoperative complications and overall cost of the replacement therapy were determined.

Results

The operative period was uneventful. We did not notice any bleeding during both procedures; we even had the impression that the achieved hemostasis was better than in non-hemophilic patients. The operative time, from incision to skin closure, was 60 min for the hernia repair, and 45 min for the laparoscopic appendectomy. The extra operative cost for the inguinal repair was 445 Euros (LigaSure™ 5 mm instrument) and 922 Euros for the laparoscopic appendectomy (LigaSure™ 5 mm and Endo GIA™ instrument and cartridge).

Table 1: Postoperative factor VIII plasma level

	Postoperative factor VIII plasma level			
Major surgery desired level % of normal [13]	Post op day 1-3 60–80	Post op day 4-6 40–60	Post op day 7-14 30–50	
Achieved level	Post op day 1	Post op day 4	Post op day 8	Post op day 11
Hernioplasty	68%	80%	74%	65%
Appendectomy	99%	105%	92%	50%

The postoperative period was also uneventful. The postoperative factor plasma level is shown in Table 1. The overall cost for the 14-day treatment with a replacement therapy for the patient with an inguinal hernia was 5361 Euros, while for the second patient it was 5929 Euros. The postoperative hospital stay was 8 days, after which both patients received a replacement therapy in the outpatient department.

Discussion

Surgery in patients with haemophilia requires a specialised team approach and a hospital capable of supporting intense factor concentrate use and timely laboratory monitoring. The optimal approach utilises the coordination and resources of the comprehensive Hemophilia Treatment Center team working closely with the surgeon and anesthesiologist [4]. The surgical team should use a surgical technique which will ensure proper and permanent hemostasis to prevent unnecessary blood loss without extending the operating time at the same time. We are committed to using the available surgical technologies and techniques with a proven value in the best clinical practice for all of our patients if their use is cost-effective. Our extensive experience in using an advanced bipolar technology and electrosurgery during major open and advanced laparoscopic procedures, enable us to feel safe and secure when applying these technologies in haemophiliacs [8]. Current evidence suggests that skin incisions with electrosurgery are quicker and associated with less blood loss than those made with a scalpel, and there are no differences in the rate of wound complications or postoperative pain [9, 10]. We routinely use this technique in all our patients, including the two patient with haemophilia. We do not use enhanced LigaSure™ tissue fusion technology for hernioplasty and appendectomy routinely in non-hemophilic patients because it is not cost-effective, but these procedures are defined as major procedures in

haemophiliacs because they require hemostatic support for periods exceeding 5 consecutive days [11]. Current evidence suggests that the use of this technology can be achieved safely by sealing a variety of thoracic and anterior abdominal wall tissues with an injury and leakage profile comparable to the established technologies [12]. So, if using this technology, the ultimate goal of preventing blood loss and additional replacement therapy in haemophiliacs is achieved, the use of expensive instruments will be justified. Our results show that we achieved proper and permanent hemostasis. Furthermore, with a standardised replacement therapy, the postoperative factor VIII plasma level was above the recommended level [13]. Perhaps, this difference between the desired and achieved plasma factor VIII level was the result of our transfusiologist's precaution and her previous experience with the conventional surgery.

Laparoscopic procedures are contraindicated in patients with an uncorrectable coagulopathy, but whether a laparoscopic or conventional surgery should be recommended in hemophilic patients is still a controversial question [14, 15]. We preferred an individual approach for the treatment of our patients. Our experience with thrombocytopenic patients, during laparoscopic splenectomy for ITP, has shown that it is essential to prevent unnecessary damage to the abdominal wall when providing access ports and using methods for hemostasis independent of the coagulation and fibrinolytic processes [16, 17]. It justifies the use of a laparoscopic access in our patients with a radially expandable access system, and an abdominal drain inserted through a port access, and at the same time achieving hemostasis with the LigaSure™ and Endo GIA™ Tri-Staple™ technologies.

Compared with the operative time for non-hemophilic patients, the operative time for our patients was longer but not significantly. In the study of Lingohr at al., no significant differences were found in the duration of surgery and drained in laparoscopically or conventionally operated haemophiliacs versus matched pairs [15]. On the other hand, the postoperative hospital stay of our patients, compared with non-hemophilic patients, was longer due to the replacement therapy. A prolonged hospital stay in haemophiliacs was also found in the study of Goldmann at al. [18] and Coppola at al. [19]. In the study of Lingohr at al., a significantly shorter hospital stay was achieved in haemophiliacs treated with laparoscopic vs. conventional procedures resulting in reduced therapeutic costs and a faster mobilisation [15].

The overall cost of the treatment for haemophiliacs is high, mostly due to the necessary replacement therapy or because of postoperative complications [1,18-20]. In our cases, the extra operative cost was 8.5% and 15.5% respectively from the total cost of the replacement therapy. In the postoperative period, there were no complications or need for additional therapy, since in the both patients the achieved factor VIII levels were above predefined target ranges as stated by the international guidelines [13]. Karaman at al. in their study confirmed that electrocautery with a direct current is a safe and long-term reliable method for hemostasis during circumcision in bleeding disorders and can be used with an updated factor replacement protocol with a lower cost and approximately the same complication rates [6]. The efficiency and safety of the enhanced LigaSure™ tissue fusion technology in providing proper and permanent hemostasis with reduction of the operating time has been demonstrated in many studies [12, 16, 21, 22]. The achieved hemostasis with the tissue fusion technology is permanent and exceeds the time required for satisfactory healing of surgical wounds of 2-3 weeks after surgery [23]. In future, the conclusion of Hazendonk at al. that the quality of care and cost-effectiveness of perioperative treatment of haemophilia A patients can be upgraded by refining the dosing strategies based not only on individual patient characteristics and mode of infusion but the basis of the applied technique for surgical hemostasis as well. Our opinion is supported by the results of Karaman at al. and Aryal et al. [25]. Aryal et al. which indicate that postoperative hemorrhagic complications in no case were attributable to inadequate factor replacement.

Our experience in the treatment of hemophilics is modest, but we have applied the above-mentioned techniques in non-hemophilic patients and patients with impaired hemostasis due to thrombocytopenia with very good results. In both patients, we avoided the use of contact and sprayed coagulation with a conventional electrosurgery. The results of the treatment achieved in both hemophilic patients showed that our approach was justified.

In conclusion, with new surgical technologies, proper and permanent hemostasis can be achieved, without prolonging the operation time. New surgical technologies facilitate surgical hemostasis and surgery in hemophilic patients, but further studies are needed to select the best clinical practice.

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