



(RESEARCH ARTICLE)



Multimodal strategies to improve surgical outcome: Our protocol management in the ENT Surgery department

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World Journal of Advanced Research and Reviews, 2023, 17(03), 890–897

Publication history: Received on 13 February 2023; revised on 22 March 2023; accepted on 25 March 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.17.3.0483>

Abstract

Multimodal rehabilitation brings together the experience from health professionals from de fields of surgery, anesthesia, nursery and nutrition with the main objective of becoming the standard management necessary to improve the healthcare quality of surgical patients.

According to statistics from our country, in the last 5 years the 70% of the surgery of the head and neck were performed by ENT specialists. Because of this, our special interest in the perioperative management of the nutritional state, pain, stress, immune modulation.

We present the protocol of our Unit of Head and Neck Surgery in pharyngolaryngeal surgery.

Keywords: ENT Surgery; Multimodal Protocol; Perioperative Quality; Enhanced recovery

1. Introduction

One decade ago, started in abdominal surgery the programs of multimodal rehabilitation, also known as “fast track” or “ERAS” (Enhanced Recovery After Surgery). The programs are based in the possibility of diminish surgical stress trough advances in anesthesia techniques, minimally invasive surgery and perioperative care (1).

These programs are protocols or clinical guides, formed by the union of different unimodal perioperative actions to achieve a summatory effect and improve the recovery of surgical patients (2). These models are medical-surgical and multidisciplinary and affects all stages from perioperative care.

Evidence exist from different studies and meta-analysis (3-5) that once implemented, they significantly reduce morbidity and hospitalary stay.

One of the main pillars of the protocol is nutrition and metabolism. It is well known that the catabolic response induced by surgery, with the subsequent hormonal liberation (glucagon, cortisol, catecholamines) and inflammatory mediators could favor insulin resistance. This is manifested by the differences in the surgical outcomes from patients with adequate and inadequate nutritional state (6). Therefore, nutritional state before surgery it's a predictive factor for clinical outcomes (7).

Malnutrition is associated with a progressive tissular exhaustion and malfunction from different organs and systems, like cardiopulmonary, renal and digestive. All this results in a diminished immunity, which favor infectious post-surgical complications, besides from a higher risk of cardiopulmonary complications and a prolonged diminished mobility,

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prolonging the surgical recovery of the patient. Accordingly, an appropriate nutritional-metabolic enhancement in the perioperative affects favorably the morbimortality (8-10).

2. Material and methods

We expose our Pharyngolaryngeal surgery protocol:

Time frame	Protocol	Specialist
Prior to admission	First consultation visit Clinical history and request for complementary tests. With results, presentation of case in Oncology Committee.	Nurse Surgeon
	Second consultation visit Complete information from surgical process to patient and family. Screening, nutritional evaluation (Test MUST) and nutrition optimization. If malnutrition: hospital admission and nutritional improvement. Solid dysphagia: liquid diet with nutritional supplements. Evaluation and management of presurgical anemia. Anesthesiologist evaluation. Eliminate toxic habits (tabaco, alcohol, etc...). Respiratory conditioning. Psychological evaluation. Education by tracheostomy unit (if needed). Informed consents signature and documentation hand over.	Nurse Surgeon Anesthesiologist Psychologist
Day before surgery (if possible coordinate hospital admission same day as surgery)	Admission Admission check list. Thromboembolic prophylaxis according to local protocols. Solid food fasting 6h before surgery and liquids fasting 2h before surgery. Preparation of donors areas in the case of flaps with pectoral or radial reconstruction surgery. Intestinal preparation in the case of reconstruction surgery with intestinal plasty.	Nurse
Perioperative	Immediate preoperative Preoperative check list. Supplement of carbohydrate drink (12.5% maltodextrins 250 cc) 2 hours before surgery if there is no contraindication. Placement of compression socks or intermittent pneumatic compression, according to thromboembolic risk. Antibiotic prophylaxis 30-60 min before the surgical incision. If delayed gastric emptying: regurgitation prophylactic measures.	Nurse Anesthesiologist
	Intraoperative Operating room check list. Standard monitoring of anesthetic depth, muscle relaxation and core temperature. Active heating with thermal blanket and fluid heater. Invasive arterial cannulation for hemodynamic management if necessary. Central venous catheter placement. Use of short-acting anesthetic agents. Assess deep muscle relaxation. Ventilation strategies	Nurse Anesthesiologist Surgeon

	<p>FiO₂ necessary to produce normal levels of oxygen in arterial blood. Early extubation if tracheostomy is required. Bladder catheterization. (Withdraw at 24-48 h). Nasogastric tube (maintain according to surgery). Goal-Guided Fluid Therapy, avoiding fluid overload. Nausea and vomiting prophylaxis according to the APFEL scale. Thromboembolic prophylaxis. Use of drains according to surgery.</p>	
	<p>Immediate postoperative period (Resuscitation Unit) Watch out for warning signs. Cleaning of the wound and aspirations with physiological serum of the tracheostoma. Compressive bandage. Absolute diet. Enteral nutrition (NG tube) (beginning 8 hours after the intervention) according to surgery. 10 cc/hour the first 8 postoperative hours. 20 cc/h 8-16 postoperative hours. 30 cc/h 16-24 postoperative hours. If NG tube is not used: Total Parenteral Nutrition (TPN) by central catheter. Start of mobilization (sitting in bed) from 6-8 hours after surgery depending on the type of surgery. Ensure good pain control: combined analgesia. Maintenance of FiO₂ 0.5% 2 hours after finishing the intervention. Restrictive intravenous fluid therapy. Thromboembolic prophylaxis. Treatment of nausea and vomiting, according to the APFEL scale. Diuresis control. Flap perfusion control, if applicable. Control of local drainage. Control tests: Blood analysis. Arterial or venous gasometry. Chest X-ray.</p>	<p>Nurse Anesthesiologist</p>
<p>1st postoperative day (Resuscitation Unit)</p>	<p>Cleaning of the wound and aspirations with physiological serum of the tracheostoma. Compressive bandage. Absolute diet. Enteral nutrition (NG tube). Increase protein intake. Progress enteral nutrition (do not exceed 40 ml/h). If NG tube is not used: Total Parenteral Nutrition (TPN) by central catheter. Mobilization (sitting in bed) depending on the type of surgery. Ensure good pain control: combined analgesia. Stimulate deep breathing. Restrictive intravenous fluid therapy. Thromboembolic prophylaxis. Treatment of nausea and vomiting, according to the APFEL scale. Diuresis control. Flap perfusion control, if applicable. Control of local drainage.</p>	<p>Nurse Anesthesiologist Surgeon</p>

	<p>Control tests: Blood analysis including C reactive protein and procalcitonin Arterial or venous gasometry. Chest X-ray.</p>	
<p>2nd postoperative day (Resuscitation Unit – hospitalization floor)</p>	<p>Cleaning of the wound and aspirations with physiological serum of the tracheostoma. Compressive bandage. Absolute diet. Enteral nutrition (NG tube). Increase protein intake. Progress enteral nutrition (do not exceed 100 ml/h). If NG tube is not used: Total Parenteral Nutrition (TPN) by central catheter. Mobilization: limited walking. Ensure good pain control: combined analgesia. Stimulate deep breathing. Remove vesical tube. Restrictive intravenous fluid therapy. Thromboembolic prophylaxis. Flap perfusion control, if applicable. Control of local drainage. Control tests: Blood analysis Chest X-ray.</p>	<p>Nurse Anesthesiologist Surgeon</p>
<p>3th postoperative day (Resuscitation Unit – hospitalization floor)</p>	<p>Cleaning of the wound and aspirations with physiological serum of the tracheostoma. Compressive bandage. Absolute diet. Enteral nutrition (NG tube). Enteral nutrition (do not exceed 100 ml/h). If NG tube is not used: Total Parenteral Nutrition (TPN) by central catheter. Mobilization: progressive physical activity according to surgery. Ensure good pain control: combined analgesia. Stimulate deep breathing. Restrictive intravenous fluid therapy. Thromboembolic prophylaxis. Flap perfusion control, if applicable. Consider remove of local drainage if production less than 50cc/24h. Control tests: Blood analysis including C reactive protein and procalcitonin Chest X-ray.</p>	<p>Nurse Surgeon</p>
<p>4th postoperative day (Hospitalization floor)</p>	<p>Cleaning of the wound and aspirations with physiological serum of the tracheostoma. Compressive bandage. Absolute diet. Enteral nutrition (NG tube). Enteral nutrition (do not exceed 100 ml/h). If NG tube is not used: Total Parenteral Nutrition (TPN) by central catheter. Mobilization: progressive physical activity according to surgery. Ensure good pain control: combined analgesia. Stimulate deep breathing. Remove fluid therapy.</p>	<p>Nurse Surgeon</p>

	<p>Thromboembolic prophylaxis.</p> <p>Control tests:</p> <p>Blood analysis with hemogram, biochemical and coagulation.</p> <p>Chest X-ray.</p>	
5th postoperative day (Hospitalization floor)	<p>Cleaning of the wound and aspirations with physiological serum of the tracheostoma.</p> <p>Compressive bandage.</p> <p>Absolute diet. Enteral nutrition (NG tube).</p> <p>Enteral nutrition (maintain flow). If NG tube is not used: Total Parenteral Nutrition (TPN) by central catheter.</p> <p>Mobilization: progressive physical activity.</p> <p>Ensure good pain control: combined analgesia.</p> <p>Stimulate deep breathing.</p> <p>Thromboembolic prophylaxis.</p> <p>Control tests:</p> <p>Blood analysis including C reactive protein and procalcitonin.</p>	Nurse Surgeon
6th postoperative day (hospitalization floor)	<p>Cleaning of the wound and aspirations with physiological serum of the tracheostoma.</p> <p>Compressive bandage.</p> <p>Absolute diet. Enteral nutrition (NG tube).</p> <p>Maintain Enteral nutrition and/or Total Parenteral Nutrition (TPN).</p> <p>Mobilization: progressive physical activity.</p> <p>Ensure good pain control: oral analgesia.</p> <p>Stimulate deep breathing.</p> <p>Thromboembolic prophylaxis.</p> <p>Education in tracheostomy tube manipulation.</p> <p>Muscular physiotherapy.</p>	Nurse Surgeon
7th-10th postoperative day (hospitalization floor) Discharge	<p>Cleaning of the wound and aspirations with physiological serum of the tracheostoma.</p> <p>Take out compressive bandage.</p> <p>Initiate oral diet maintaining NG tube.</p> <p>If correct nutrition intake orally, remove NG tube.</p> <p>Mobilization: progressive physical activity.</p> <p>Ensure good pain control: oral analgesia.</p> <p>Stimulate deep breathing.</p> <p>Thromboembolic prophylaxis.</p> <p>Possible discharge if meet next criteria:</p> <p>No surgical complications.</p> <p>No fever.</p> <p>Correct pain management with oral analgesia.</p> <p>Appropriate mobilization.</p> <p>Good oral intake or independent using NG tube.</p> <p>Triturate diet.</p> <p>Independent for tracheostomy tube changes.</p> <p>Documentation handover:</p> <p>Home recommendations.</p>	Nurse Surgeon

	Education and dietary recommendations. Dates for follow up visits. Satisfaction questionnaire.	
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3. Discussion

The environment has evolved in the last years to be more surgical services where hospitalary stay have lost importance.

The evolution of operating room infrastructures results in a increasingly higher cost of surgical activity. This is explained by the safety requirements in the operating room, the increase in the complexity of the interventions and the availability of a more specialized technology (11,12).

The greater efficiency of surgical processes is the base for the design of the new hospital pattern, eminently surgical, highlighting the increase in the development of protocols related to perioperative rehabilitation.

Multimodal rehabilitation has emerged as a need for surgery in recent years. Its objective is to reduce the impact of perioperative stress, optimizing the patient's recovery with a reduction in complications and convalescence time. In this sense, stress is related to factors that threaten homeostasis.

There is evidence that postoperative morbidity is the result of a set of factors that depend both on surgery and on the response to it and its consequences. To reduce it, measures are required that range from adequate preoperative information for the involvement of the patient, to actions to reduce stress, control pain and modify perioperative care.

Fast-track surgery works through protocols according to the surgical specialties, including different anesthetic techniques, pain control, rehabilitation or early nutrition. This is intended to reduce the response to surgical stress and organ dysfunction and thus shorten recovery time (13-15).

The Enhanced Recovery After Surgery protocols (ERAS) and multimodal rehabilitation procedures (MMRP) add preoperative, intraoperative, and postoperative indications. The main processes of the protocols are: preoperative information, preparation before the intervention, attenuation of the response to surgical stress, limitation of postoperative pain and vegetative symptoms through anesthetic, analgesic techniques and stimulating early mobilization. In addition to using early enteral nutrition techniques and avoiding the use of drains (or their early removal).

The results of these ERAS protocols according to the reviewed literature are: the reduction of complications, length of stay and recovery. Initiate the patient in decision-making and participation in the process. Follow-up of the patient throughout the surgical process and optimization of quality during care and their satisfaction (16).

Various published works have quantified the effects of this type of model, resulting in a shorter length of hospital stay (30-50%) and a reduction in complications. As well as the reduction of readmissions and costs (17).

4. Conclusion

Multimodal rehabilitation has a significant positive impact on the quality of care. It improves the experience and satisfaction of the patient, ensuring that the patient is operated on in optimal conditions, minimizing postoperative complications and achieving a more effective and early rehabilitation. It also allows for a reduction in hospital stay both on the ward and in Intensive Care Units.

In the MMRP programs, emphasis is placed on nutritional assessment and treatment prior to surgery (nutritional prehabilitation), on early initiation of oral tolerance in the postoperative period, which helps to minimize the catabolic impact, reducing the risk of suture dehiscence and improving postoperative recovery.

We must agree on nutritional optimization and the contribution of more appropriate nutritional supplements in each of the protocols. In addition to the search for the benefits of immunonutrition in surgical patients.

Fast-track surgery and ERAS protocols make possible to reduce the length of hospital stay and morbidity and mortality of the surgical patient.

Compliance with ethical standards

Acknowledgments

We would like to thank all the nursing staff, both in the operating room and in pre-surgical preparation and post-operative care, for their participation in the development of this protocol.

Disclosure of conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

- [1] Kehlet H, Wilmore DW: Multimodal strategies to improve surgical outcome. *Am J Surg* 2002, 183:630-641.
- [2] Gan TJ, Soppitt A, Maroof M, el-Moalem H, Robertson KM, Moretti E, Dwane P, Glass PS: Goal-directed intraoperative fluid administration reduces length of hospital stay after major surgery. *Anesthesiology* 2002, 97:820-826.
- [3] Khan SA, Ullah S, Ahmed J, Wilson TR, McNaught C, Hartley J, Macfie J. Influence of enhanced recovery after surgery pathways and laparoscopic surgery on health related quality of life. *Colorectal Dis.* 2013
- [4] Lemanu DP, Singh PP, Berridge K, Burr M, Birch C, Babor R, MacCormick AD, Arroll B, Hill AG. Randomized clinical trial of enhanced recovery versus standard care after laparoscopic sleeve gastrectomy. *Br J Surg.* 2013 Mar;100(4):482-9
- [5] Coolson MM, van Dam RM, van der Wilt AA, Slim K, Lassen K, Dejong CH. Systematic Review and Meta-analysis of Enhanced Recovery After Pancreatic Surgery with Particular Emphasis on Pancreaticoduodenectomies. *World J Surg.* 2013 Apr 9
- [6] Gustafsson UO, Scott MJ, Schwenk W, Demartines N, Roulin D, Francis N, McNaught CE, MacFie J, Liberman AS, Soop M, Hill A, Kennedy RH, Lobo DN, Fearon K, Ljungqvist O; Enhanced Recovery After Surgery Society. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *Clin Nutr.* 2012 Dec;31(6):783-800
- [7] Grol R, Grimshaw J: From best evidence to best practice: effective implementation of change in patients' care. *Lancet* 2003, 362:1225-1230.
- [8] Consensus views on implementation and measurement of enhanced recovery after surgery in England: Delphi study. Knott A, Pathak S, McGrath JS, Kennedy R, Horgan A, Mythen M, Carter F, Francis NK. *BMJ Open.* 2012 Dec 12;2(6)
- [9] Lu D, Wang X, Shi G. Perioperative enhanced recovery programmes for gynaecological cancer patients. *Cochrane Database Syst Rev.* 2012
- [10] Bianchini C, Pelucchi S, Pastore A, Feo CV, Ciorba A. Enhanced recovery after surgery (ERAS) strategies: possible advantages also for head and neck surgery patients? *Eur Arch Otorhinolaryngol.* 2013
- [11] Knott A, Pathak S, McGrath JS, et al. Consensus views on implementation of enhanced recovery after surgery in England. Delphi study. *BMJ Open* 2012.
- [12] Lee L, Li C, Landry T, Latimer E, Carli F, Fried GM, Feldman LS. A Systematic Review of Economic Evaluations of Enhanced Recovery Pathways for Colorectal Surgery. *Ann Surg.* 2013 May 12
- [13] M. Scharfenberg, W. Raue, T. Junghans, W. Schwenk . "Fast-track" rehabilitation after colonic surgery in elderly patients—is it feasible?. *Int J Colorectal Dis* (2007) 22:1469–1474.
- [14] Schwenk W, Gunther N, Wendling P, Schmid M, Probst W, Kipfmuller K, Rumstadt B, Walz MK, Engemann R, Junghans T: "Fast-track" rehabilitation for elective colonic surgery in Germany--prospective observational data from a multi-centre quality assurance programme. *Int J Colorectal Dis* 2008, 23:93-99.
- [15] Braumann C, Guenther N, Wendling P, Engemann R, Germer CT, Probst W, Mayer HP, Rehnisch B, Schmid M, Nagel K, Schwenk W; Fast-Track Colon II Quality Assurance Group. Multimodal perioperative rehabilitation in elective conventional resection of colonic cancer: results from the German Multicenter Quality Assurance Program 'Fast-Track Colon II'. *Dig Surg* 2009, 26:123-9.

- [16] Scott NB, McDonald D, Campbell J, Smith RD, Carey AK, Johnston IG, James KR, Breusch SJ. The use of enhanced recovery after surgery (ERAS) principles in Scottish orthopaedic units--an implementation and follow-up at 1 year, 2010-2011: a report from the Musculoskeletal Audit, Scotland. Arch Orthop Trauma Surg. 2013 Jan;133(1):117-24.
- [17] Stephen AE, Berger DL: Shortened length of stay and hospital cost reduction with implementation of an accelerated clinical care pathway after elective colon resection. Surgery 2003, 133:277-282.