Selecting anaesthesia modality in oesophageal dilation in an outpatient setting: a cases series and a proposal for a clinical algorithm

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Abstract

Aim Most cases of oesophageal strictures can be treated effectively with elective outpatient endoscopic dilation in a specialized centre. With this case series review, we aim to evaluate our patient cohort from June 2020 to January 2022.

Methods: We retrospectively analyzed 185 consecutive patients submitted to oesophageal and pyloric dilation procedures in day surgery settings from June 2020 to January 2022.

Results: In our retrospective case series, we analyzed 185 patients submitted to oesophageal dilation (89%) or pyloric dilation (11%). Analysis of the type of anaesthesia correlated to the primary diagnosis showed that 52% of achalasia patients had deep sedation via native airway, and caustic stricture was corrected in almost all cases during general anaesthesia (89%).

It is worth noting that in our study, only 1.6% of patients experienced complications that prevented same-day discharge, such as fever or arrhythmia. Severe complications, including significant bleeding or perforation, were entirely absent.

Conclusions: We can conclude that oesophageal dilations were performed with safety and efficiency in our centre, with very few unplanned recoveries and a negligible rate of complications. The standardization of outpatient care pathways has further bolstered our efficiency, ensuring the best possible outcomes for our patients.

Keywords: Day surgery, Anaesthesia, Oesophageal Dilation.

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Introduction

Oesophageal stricture is a debilitating condition that reduces one's quality of life and increases the risk of malnutrition. [1]

There are various etiologies for oesophageal strictures: caustic ingestion, prior radiation therapy, malignancy, infectious or eosinophilic oesophagitis, extrinsic compression, surgical anastomosis stricture, achalasia, etc. [2]

Oesophageal obstruction causes dysphagia and regurgitation of enteric material, increasing the risk of aspiration pneumonia. [3]

Diagnosis is achieved by upper gastrointestinal transit with an idrosoluble contrast agent and endoscopy. [4] The goals of therapy are relief of dysphagia and prevention of stricture recurrence.

There are two main types of procedures [5]:

1. Mechanical dilation (with bougie and guidewire, we use the Savary- Gillard model)
2. Balloon dilation is also classified as Through the Scope Technique (TTS, balloon filled with water) and Rigiflex dilation (balloon filled with air, not passing through the scope).

The preferred technique for mechanical dilation in our center involves using Savary-Gilliard dilators, which are cylindrical tubes made of polyvinyl chloride and have a central channel for the guidewire. [4,6]

Through The Scope, balloon dilators are available in different types and sizes; in our center, they are used only with wire guide guidance. The balloon is an inflatable thermoplastic polymer that allows uniform expansion to the targeted diameter [4,5]. For achalasia dilation, wire-guided polyethylene balloon dilators that do not pass through the scope are used (known as the Rigiflex technique) [4].

The anesthetist must evaluate every patient pre-operatively. Moreover, according to guidelines, appropriate measures are necessary to manage patients using antiplatelet/anticoagulant agents. [6]

The anaesthesiology management for oesophageal dilation presents a complex challenge: patients often have multiple long-term conditions, and their upper gastrointestinal anatomy is altered due to their underlying disease [7,8]. This underscores the crucial role of healthcare professionals in ensuring safe and effective procedures.

In particular, achalasia patients are at maximum risk for aspiration of enteric material during anesthesia induction, [7] and nonetheless, patients previously submitted to oesophageal surgery [8, 9] are at the same risk.

All procedures were meticulously performed in the operating room, equipped with all necessary tools to manage difficult airways. It is important to note." that these procedures were carried out in total compliance with the current standard of care [10, 11], ensuring the highest level of safety and quality.

Most cases of oesophageal strictures can be treated with outpatient endoscopic dilation in a specialized center.

With this case series review, we aim to evaluate our patient cohort from June 2020 to January 2022.

Methods

After approval by the Local Research Ethics Committee (Comitato Etico Regione Toscana—Area Vasta Nord Ovest CEAVNO, approval number: 25490_SIDOTI), a single-center, observational, retrospective case series review took place at Pisa University Hospital. We retrospectively analyzed 185 consecutive patients submitted to oesophageal and pyloric dilation procedures in day surgery settings from June 2020 to January 2022. Informed consent was obtained from every patient. The following variables were recorded: patient characteristics (Age, American Society of Anesthesiologists physical status - ASA PS, prediction of difficult airway management, Body mass index - BMI), principal diagnosis, procedure type and length, type of anesthesia, type of complications (surgical or medical) and relative incidence. Data are expressed in median and standard deviation or percentage where appropriate.

Results

One hundred eighty-five consecutive patients were submitted to oesophageal dilation in most cases (165 out of 185, 89%),and 17 patients(11%) were submitted to pyloric dilation (table 1). The average age is 61 years, and almost half of the total is classified in ASA PS 3 (patient with a severe systemic disease that is not life-threatening but causes some limitations) [12]. Body Mass Index (BMI) was, on average, normal (24 ±4), with a range between 17 and 36; 5% of patients hada BMI above 30 (table 1). In 3% of cases, there is a predicted difficult airway, and 12% have preexisting surgical tracheotomy (Table 1).

Table 1 Patient characteristics and diagnosis data are expressed in average ± standard deviation SD (first column) or percentage (second column) where appropriate. BMI, Body Mass Index; ASA American Society of Anesthesiologists Physical Status.

Patient characteristic		
Female	82	
Age	61 ± 14 SD	44%
BMI	24 ± 4 SD (range 17-36)	
BMI > 30	10	5%
ASA PS 1	3	1%
ASA PS 2	93	50%
ASA PS 3	89	49%
Prediction of difficult airway management	10	3%
Patients with Tracheotomy	23	12%
Main diagnosis		
Non-caustic oesophageal strictures	115	62%
Achalasia	35	19 %
Caustic oesophageal strictures	18	10%
Post-surgical pyloric stenosis	17	9%

The primary diagnosis is non-caustic oesophageal stenosis, accounting for 62% of the total (Table 1). TTS dilation is the main procedure performed, representing 48% of the total, and is used for esophageal and pyloric stenosis. It is followed by Savary (37%) and Rigiflex dilation (15%). Pyloric stenosis is represented to a lesser extent (11%): all the pyloric strictures are post-surgical, consequent to Ivor Lewis's esophagectomy.

On average, the procedures were brief (17 minutes±7)(Table 2). In most cases, deep sedation by native airway and spontaneous ventilation (57%) with supplemental oxygen. When general anaesthesia with oro-tracheal intubation was chosen (43%), we preferred to administer total intravenous anaesthesia in 77 %. The necessity to convert deep sedation to general anesthesia due to respiratory impairments was needed in 2 patients out of 185 (Table 2)

Table 2 Intra-Procedural description and complications, data are expressed in average ± standard deviation SD (first column) or percentage where appropriate (second column) SED, Sedation with a native airway and spontaneous ventilation; GA, General Anesthesia; TIVA, Total Intravenous Anesthesia; VA, Volatile Anesthesia.

Dilatation technique performed		
Dilatation TTS (oesophageal and pyloric)	88	48%
Savary dilatation	71	37%
Rigiflex dilatation	26	15%
Timing	10	5%
Endoscopic Procedures duration (min)	17 ±7 (SD)	
Procedure repetition	93	50%
Repetition number average	3,4 ± 3,4 (SD)	
Patients in which more than two procedures were performed	35	18%
Patients in which more than three procedures were performed	23	12%
Subdivide by diagnosis:	15	8%
Caustic stenosis	6	40%
Post radiation stenosis	4	27%
Post-surgery stenosis	5	33%
Type of anesthesia	17	9%
SED	106	57%
GA	79	43%
TIVA	61	77.5%
VA	18	22.5%
Intraprocedural conversion from SED to GA	2	1%
Complications		
Major bleeding	0	
Moderate bleeding	7	3.7%
Minimal self-limited bleeding	22	11%
Perforation	0	
Post-procedural fever	2	1%
Unpredictable admission to ordinary ward due to complication occurrence	3	1.6%

An analysis of the type of anesthesia used in correlation to the primary diagnosis revealed that 52% of achalasia patients received deep sedation via native airway, and almost all cases of caustic stricture were corrected during general anesthesia (89%) (refer to Table 3 for more details). Out of 185 patients, 3 (1.6%) could not be discharged due to complications: two patients developed a fever in the immediate post-procedural period, and the third patient experienced intra-operative atrial fibrillation with an elevated frequency (refer to table 2). Significant complications such as bleeding with hemodynamic impact or the need for blood transfusion did not occur. Seven cases had no self-limited bleeding, with the need to place endoscopic metallic clips in five cases or hot biopsies forceps coagulation in two cases (Table 2). Self-limited bleeding occurred in 11% of patients without any need for measures. There were no cases of perforation.

Table 3 Intra-Procedural description and complications, data are expressed in average ± standard deviation SD (first column) or percentage where appropriate (second column) SED, Sedation with a native airway and spontaneous ventilation; GA, General Anaesthesia; TIVA, Total Intravenous Anaesthesia; VA, Volatile Anaesthesia.

Diagnosis	SED	GA
Oesophageal stenosis (generic)	69(60%)	46 (40%)
Achalasia	18 (52%)	
Caustic strictures	2 (11%)	16 (89%)
Pyloric stenosis	11 (65%)	6 (35%)

In all cases, there have been no long-term adverse outcomes. Fifteen patients (8%) needed more than three dilations; most of them were caustic stenosis (40%). (Table 2).

Discussion

Our cohort comprises mostly of patients who underwent oesophageal dilation. Despite half of them having severe comorbidities (ASA PS 3), they were discharged on the same day, adhering to day surgery discharge criteria [13,14].

Our anesthesia strategy is guided by the type of diagnosis and planned procedure. Sedation with the native airway was the preferred method in the majority of cases, with a notably low rate of conversion to general anaesthesia, primarily attributed to respiratory complications.

In our study, we successfully performed sedation in nearly half of the achalasia patients without any complications. This was possible due to the careful selection of patients, especially those who had undergone previous interventions.

We found that oesophageal conditions are rarely associated with obesity. However, in our study, around 5% of patients were obese. In such cases, airway management during anesthesia could become complex, with difficulty in bag-mask ventilation and orotracheal intubation [15].

For general anesthesia, we prefer endovenous anesthesia due to its rapid awakening and low incidence of post-operative nausea and vomiting (PONV) [16]. To ensure safety and faster recovery from general anesthesia, we used sugammadex to fully reverse neuromuscular blockade in all patients [17]. Post-operative pain prevention was implemented with Acetaminophen and Non-Steroidal Anti-Inflammatory Drugs, according to the invasiveness of the procedure.[18]

We have not encountered any significant complications during the procedure. According to existing literature, the incidence of perforation for benign strictures is 1.1%, with a mortality rate of 0.5%. The risk of perforation is higher among less experienced endoscopists. In our experience, all dilations were performed by a single proficient operator, which has allowed for standardization of the procedure and improvement of safety.

Anastomotic, post-radiation, and caustic strictures are often complex, such as longer (> 2cm), angulated, and often with narrowed diameters. We have observed that patients who require more than three dilations have one of the aforementioned diagnoses. To significantly reduce the risk of perforation and bleeding, cautiously incremental dilation is necessary.

The commonly known "rule of three" has been applied in our cohort [21]. his method involves starting the first dilation from the initial diameter of the lumen and increasing it by three millimeters. The n, the procedure is stopped and rescheduled for at least ten days later. Complex strictures are typically treated under general anesthesia to ensure airway safety due to the complexity of the underlying pathology and the nature of the scheduled procedure.

During the post-operative period, every patient is evaluated to determine the severity of their pain and the appropriate treatment is administered [20]. Prior to being discharged to go home, patients need to be able to swallow adequately, and the Anaesthetic Discharge Scoring System (PADSS) needs to be fulfilled (see Figure 1). A score of 9 or more points is required for discharge [13,22]. Each patient is entrusted to their caregiver.

The clinical pathway mentioned above is summarized and represented in Figure 2.

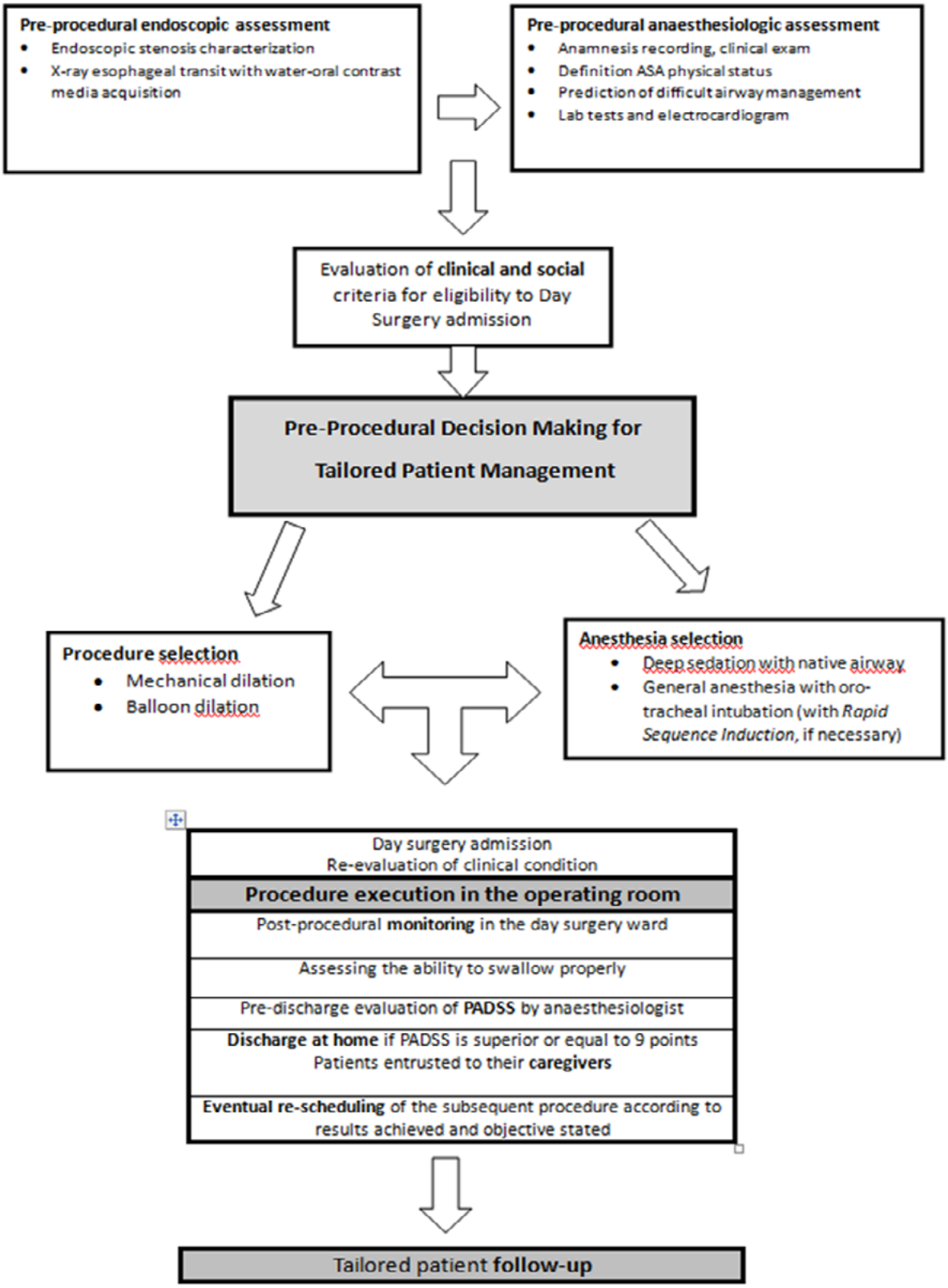
Conclusions

We can conclude that oesophageal dilations were performed safely and efficiently in our centre, with very few unplanned recoveries and a negligible rate of complications. Standardizing the outpatient care pathway has led to enhanced efficiency: performing oesophageal dilation in the outpatient setting is brought to the facility of admission, which guarantees continuity of care. This is especially important if the procedure needs to be repeated in the short term. However, this system also reduces costs.

Figure 1 Post Anesthetic Discharge Scoring System (PADSS).

Category	Description	Score
Vital signs	< 20% of preoperative value 20-40% of preoperative value > 40% of preoperative value	**2** **1** **0**
Ambulation	No need for assistance, no dizziness With assistance No ambulation, dizziness	**2** **1** **0**
Nausea or vomiting	Minimal, manageable with oral drugs No ambulation, dizziness Severe, intolerable even with drugs	**2** **1** **0**
Pain	Minimal or Absent, no necessity for pain medication Moderate, manageable with pain medication Severe, intolerable even with pain medication	**2** **1** **0**
Surgical bleeding	Minimal no necessity to change the surgical dressing Moderate surgical dressings change ≤ 2 Severe need for ≥2 surgical dressings changes	**2** **1** **0**
Total		**/10**

Figure 2 Day Surgery Clinical Pathway.



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