Introduction

The increasing invasiveness of endoscopic examinations and interventions means that adequate sedation and appropriate patient monitoring are required. Overall, endoscopic interventions in the gastrointestinal tract are low risk, provided that they are performed in sufficient numbers by experienced personnel [1]. The risk of the examination or intervention depends primarily on the invasiveness and technical complexity of the procedure, but also on the patient’s individual risk profile and the specific side-effect profile of the sedatives or anesthetics used. The overall rate of serious complications in gastroenterological examinations and interventions is between 1 in 1000 and 1 in 7500 [2].

The quality of procedures and, in turn, patient safety depend greatly on precise and careful risk estimation before, during, and after the procedure. Information provided to patients on the planned procedure should not only be timely and cover the invasiveness of the procedure – it should include information not only on the risks of the procedure itself but also on the specific risks of sedation.

Risk factors

For the evaluation of the entire risk of a procedure, a clear distinction must be made between general risk (patient-specific factors), risks inherent in the procedure itself (for example pancreatitis after endoscopic retrograde cholangiopancreatography [ERCP], perforation and/or bleeding after papillotomy, and bleeding after endoscopic mucosal resection), and the risks associated with sedation. The general risk for upper gastrointestinal endoscopy depends mainly on the presence of cardiorespiratory disease and on the general health of the patient [3,4]. In this context, the complication rate increases very considerably with the length of the procedure.

Before every procedure, patient-specific risk factors must be evaluated. This is best done on the basis of the classification of the American Society of Anesthesiologists (ASA) (Table 1). Before every procedure, in the context of obtaining the patient’s informed consent, the patient’s history and medical reports must be obtained. The spectrum of clinical and preparatory studies to be ordered increases with increasing risk (see Table 2).

Sedation

Different degrees of sedation have been defined: “sedation” is understood to mean a clouding of consciousness; “deep sedation” is loss of consciousness with retention of spontaneous respiration and protective reflexes; and “general anaesthesia” is defined as loss of consciousness, spontaneous respiration, and protective reflexes, attributable to the effects of substances acting on the central nervous system. The increasing technical complexity of endoscopic procedures increasingly commonly requires deep sedation of the patient as well as adequate analgesia. Even for purely diagnostic endoscopy, sedation can be advantageous, not only for the patient but also in terms of achievement of higher-quality procedures. The following list summarizes the endoscopic procedures which most often require the use of sedation or deep sedation:

1. Interventional endoscopy in the upper gastrointestinal tract (hemostasis; treatment of varices with ligation, sclerotherapy, or tissue-adhesive therapy; dilation procedures; implantation of prostheses; endoscopic mucosal resection; and disobliteration procedures);
lower incidence of hypoxia and hypotension (though this finding does, however, received by the patient during endoscopy tend to recede. Its use in all cases did show any negative effect on the complication rate when propofol was given by nurses. In one controlled study, this was shown to be true even for high-risk patients [ASA III/IV] [14].

These data are taken into consideration in the revised “Practice guidelines for sedation and analgesia by non-anesthesiologists”, published by the American Society of Anesthesiologists in 2002 [17]. The relevant recommendation reads, “An additional person, specially entrusted with this task, must be present, who is qualified to safely administer and monitor the sedation, and to take appropriate emergency measures...”

One prerequisite for the safe use of sedatives and anesthetics is safe venous access. Apart from the administration of the sedative agent, another important safety factor when considering the use of propofol is the provision of adequate monitoring during deep sedation and after completion of the endoscopy or endoscopic intervention.

It is obvious that the endoscopist cannot be expected to simultaneously perform the endoscopic procedure, which may be very complex; administer an anesthetic with a narrow therapeutic spectrum; and monitor the patient in a dimly lit endoscopy unit. There must be an additional person present in the endoscopy suite whose sole responsibility is to administer the sedative or anaesthetic and to monitor the patient during the endoscopy. According to published data, this person can be an anesthesiologist, a specially trained physician, or a specially trained member of the nursing staff. The specially trained nurses must be familiar with the agent administered, be able to maintain respiration when complications occur or during the transition from deep sedation to general anaesthesia, and be able to handle cardiovascular side effects or complications caused by the agent administered.

In all cases, there should be complete, clear, and understandable documentation of all measures taken when a sedative or anaesthetic is administered.

**Monitoring**

With deeper sedation, it is absolutely essential to provide for suitable monitoring during endoscopy or endoscopic interventions. Monitoring of the patient is primarily the task of the designated staff member (medical or nursing personnel); technical equipment is only supplementary.

Routine endoscopy with conventional sedation calls for continuous, noninvasive oxygen monitoring (pulse oximetry), though there have been no controlled studies proving that cardiorespiratory complications are reduced when this measure is em-
ASA class III/IV

- Decompensated heart failure, NYHA class III/IV
- Coronary heart disease
- Valve disease/replacement
- Hepatic and renal failure
- Pulmonary disease
- Clotting disorders

ASA, American Society of Anesthesiologists; NYHA, New York Heart Association.

Table 3: Patients in whom the physician might anticipate a “difficult” endotracheal intubation (according to the American Society of Anesthesiologists)

<table>
<thead>
<tr>
<th>Patients with previous complications related to sedation or anesthesia</th>
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<tbody>
<tr>
<td>Patients with stridor, known sleep apnea, known tracheomalacia, or tracheal stenosis</td>
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<tr>
<td>Patients with congenital deformities of the nasopharynx (e.g. trisomy 21, Pierre Robin sequence)</td>
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<tr>
<td>Patients with relevant dental, oral, or jaw malformations</td>
</tr>
<tr>
<td>Patients with congenital or acquired conditions of the cervical spine</td>
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Table 2: Patient-specific risk factors

- The sedative effect of the agents used persists far beyond the end of the endoscopy or endoscopic intervention. Surveillance will depend on which agents have been used and the depth of sedation, and should be continued until the patient has completely recovered consciousness. There should be a suitably equipped and staffed recovery room. Pulse oximetry should be available, as should electrocardiography and noninvasive blood-pressure monitoring (for high-risk patients) after administration of propofol.
- Outpatients should only leave the recovery room when they have fully regained consciousness. The patient will have been informed in advance that for the 24 hours following sedation he or she should avoid business transactions, operating motor vehicles, and performing difficult or dangerous tasks; nonetheless, these instructions should be repeated before the patient is discharged.
- Here as well there should be clear and careful documentation of all parameters recorded and all measures taken.

Summary

1. Patient safety has the highest priority in the performance of endoscopy or endoscopic interventions and in the administration of accompanying measures such as sedation. This applies above all to the allocation of time, space, personnel, and equipment in the endoscopy suite.
2. Every procedure must be preceded by an individual risk classification assessment. The result must be recorded in writing (in the context of the information given to the patient).
3. Good venous access is a prerequisite.
4. The administration of sedatives or anesthetics must, above all, take into consideration the depth of sedation. This in turn determines the extent of monitoring. The medication and co-medications used (including trade names and dosage) must be documented, either in the endoscopy report or in a separate record.
5. There must always be an individual present who is responsible for the administration of sedatives or anesthetics. Depending on the degree of sedation on the one hand and on the presence of risk factors that could lead to a requirement for intubation on the other, this individual can be a specially trained assistant or nurse, a member of the general medical staff, or an anesthesiologist.
6. This individual is responsible for monitoring during the endoscopic procedure. The patient’s recovery must be monitored in a specially equipped unit and be briefly documented by the responsible staff there.
7. Special attention must be given to precise and detailed documentation of all steps of the process described (risk stratification, patient information, medication, procedural records).

Competing interests: None

References


Schreiber F et al. ÖGGH guidelines on sedation and monitoring in gastrointestinal endoscopy... Endoscopy 2007; 39: 259–262
8 Abraham NS, Raman M, Thompson K et al. Treatment efficacy and safety related to the use of propofol vs. conventional sedation: a meta-analysis of published controlled trials. GI Endos 2004; 59: AB128
15 Bell GD, Jones JG. Routine use of pulse oximetry and supplemental oxygen during endoscopic procedures under conscious sedation: British beef or common sense? Endoscopy 1996; 28: 718– 721