USE OF MIDAZOLAM FOR CONSCIOUS SEDATION IN UPPER GASTROINTESTINAL ENDOSCOPY

E. ANITEYE, H. ADUFUL1, N. ADU-ARYEE1, D. KOTEI, Y. ADU-GYAMFI.
Departments of Anaesthesia and Surgery, Korle-Bu Teaching Hospital, Accra, Ghana.

SUMMARY
The effectiveness, dosage regimen and amnesic properties of midazolam were studied in 77 patients who presented for upper gastrointestinal endoscopy at the Korle-Bu Teaching Hospital. Patients were given an initial dose of 0.02-0.04mg/kg of midazolam and top-up doses 0.0075-0.015mg/kg. The total doses of midazolam given for adequate sedation were 2.5mg, 3.5mg, 4.5mg, in 19%, 35% and 45% of patients respectively. The average dose of midazolam used was 0.067 ± 0.011mg/Kg. Ninety percent (90%) of the patients were awake but drowsy during the procedure, 6% were awake and anxious and 4% were asleep but responsive. Ninety-four percent (94%) of the patients had Ramsey sedation scale levels 2 to 4. Ninety-five percent (95%) of the patients had complete or partial amnesia of the procedure. Endoscopy conditions was fair to excellent in 88.3% and poor in 11.7% of the patients. Oxygen saturation during the procedure was maintained at normal limits (>92%) without oxygen supplementation.

It is concluded that midazolam in moderate doses, is a safe and effective drug for conscious sedation in upper gastrointestinal endoscopy.

Keywords: Midazolam, sedation, endoscopy, amnesia.

INTRODUCTION
There has been an increase in the use of conscious sedation for invasive and non-invasive diagnostic and radiological procedures, including upper gastrointestinal endoscopy, at the Korle-Bu Teaching Hospital. Endoscopic procedures may be distressing to patients and compliance may be improved if these procedures are done under sedation. Although diazepam was the drug of choice for outpatient endoscopy for many years, because of its good sedative and amnesic properties, it was often painful to inject, caused thrombophlebitis and sedation could be prolonged because of active metabolites.

Midazolam, an imidazo-benzodiazepine was introduced for sedation during endoscopy at the Korle-Bu Teaching Hospital two years ago. It is watersoluble, has rapid onset and recovery, excellent anxiolytic, hypnotic and amnesic effects. Its water solubility reduces pain at the site of injection and the short elimination half-life of 3.0 hours (half-life of diazepam is 90 hours), makes it ideal for the short duration of endoscopy. Amnesia is considered to be more frequent with midazolam than diazepam.

This study was done to assess the effectiveness of midazolam for upper gastrointestinal endoscopy in the local population.

METHODS
After informed consent, patients between the ages of 12-72 years scheduled for upper gastrointestinal endoscopy, from the 1st January 2000 to 31st December 2001 were included in the study. Excluded were patients with severe cardiorespiratory disease, pregnant women or patients below 12 years. All patients had an intravenous line inserted for the administration of the sedation before commencement of the procedure. The upper airway was anaesthetized with 10% lignocaine spray.

An initial dose of 0.04mg/Kg of midazolam was injected slowly by the nurse for patients below 60 years and 0.02mg/kg for patients over 60 years. Ninety seconds was allowed for the drug to take effect before the introduction of the scope. Supplement bolus doses of 0.015mg/kg for patients below 60 years and 0.0075mg/kg for patients above 60 years were injected if sedation was found to be inadequate. The same two endoscopists performed the examination.

* Author for correspondence
The nurse and the anaesthetist monitored the respiratory and heart rates, blood pressure and the oxygen saturation during the procedure. The degree of sedation was assessed using Ramsey sedation scale: 1 = awake, anxious and agitated or restless, 2 = awake and calm, 3 = drowsy but obeys commands, 4 = asleep but responds to commands, 5 = asleep but responds sluggishly to a glabellar tap or auditory stimulus and 6 = asleep and unresponsive. Conditions for endoscopy was also assessed as excellent, good, fair or poor.

One hour after endoscopy the patients were questioned as to the recall of the procedure and this was classified as no recall, partial recall or complete recall. The data was quantitatively analyzed by calculating the mean and the standard deviation for selected variables using the Microsoft Excel 2000 data analysis tool pack of the program.

RESULTS
The demographic data of the patients are presented in Table 1. The mean age was 43.1 ± 14.3 years with a range of 12-72 years. This included two 12 year-old boys who were endoscoped for duodenal ulceration. Forty-eight (62%) of the patients were males and 29 (38%) were females. The mean weight was 60.0 ± 10.8 kg (range, 40-86kg).

Table 1: Age of patients

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-20</td>
<td>2 (2.6)</td>
</tr>
<tr>
<td>21-30</td>
<td>10 (13.0)</td>
</tr>
<tr>
<td>31-40</td>
<td>17 (22.0)</td>
</tr>
<tr>
<td>41-50</td>
<td>25 (32.5)</td>
</tr>
<tr>
<td>51-60</td>
<td>12 (15.6)</td>
</tr>
<tr>
<td>61-70</td>
<td>19 (11.7)</td>
</tr>
<tr>
<td>71-80</td>
<td>2 (2.6)</td>
</tr>
</tbody>
</table>

Midazolam requirements were 4.5mg, 3.5mg and 2.5mg in 35 (45.5%), 27 (35%) and 15 (19.5%) of the patients respectively (Table 2). The average dose of midazolam used was 3.8 ± 0.6mg (0.7mg ± 0.1mg/kg).

The results show that 5 (6.4%) of the patients were not sedated, Ramsey scale of level 1, 29 (37.6%) had a scale of level 2, 40 (52.0%) had a scale of level 3 and 3 (3.9%) had a sedation scale of level 4 (Table 2). Conditions for endoscopy were excellent in 12 (15.6%), good in 30 (38.9%), fair in 26 (33.8%) and poor in 9 (11.7%) of the patients (Table 3).

Complete amnesia was observed in 66 (85.7%) of the patients, 8 (10.4%) had partial recall and 3 (3.9%) had total recall of the events during the endoscopy (Table 3). Fifty-nine (76.6%) of the patients with complete amnesia had fair to excellent conditions for endoscopy.

DISCUSSION
Upper gastrointestinal endoscopy is usually performed as day cases and can be performed without sedation. However most patients find the procedure unpleasant and this causes a lot of anxiety in repeat endoscopies. Sedation is therefore necessary for most patients. The expanding need for endoscopy and other diagnostic procedures prompted many medical committees to set up guidelines for the safe administration of sedatives in non-traditional settings. However sedation is being used in Ghana in paediatric and adult patients without any guidelines. Various sedative agents have been used for conscious sedation including diazepam, ketamine and propofol. These may have significant side-effects making them...
unsuitable for non-anaesthetists. Midazolam has largely replaced diazepam as the drug of choice for non-anaesthetists in conscious sedation.

The average dose of midazolam used was 0.067 ± 0.011 mg/kg, which is not different from doses used in previous studies in which recovery was equally rapid. A lower dose of approximately half the average dose (0.033 mg/kg) was used for the patients above 60 years old and this finding was similar to the study of Christie et al where the dose used was 0.03 mg/kg.

The majority of the patients, that is 93.7% had Ramsey sedation scale between levels 2 and 4 which indicates that they had the ideal level of sedation that allowed them to co-operate with the endoscopists. Deeper levels of sedation that is Ramsey scale level 5 to 6, usually leads to a loss of the protective reflexes and cardio respiratory depression. The patients with a sedation scale of level 1 may have been given sub-optimal doses of the midazolam. The endoscopists involved in the study had previously used conscious sedation during endoscopy using patient co-operation as the endpoint of top-up doses. There was also no monitoring of the patients sedation score and therefore the risk of deep-sedation was always present.

The complete amnesia observed in 85.7% of the patients was much higher than was observed in previous studies where a range of 75.9% to 84.0% was quoted. The high level of amnesia observed is ideal for repeat endoscopies, as patients do not remember the unpleasant aspects of the procedure. The endoscopists in the study were satisfied with 88.3% of the endoscopies and this is attributed to the high level of patient co-operation. This high satisfaction with the endoscopy conditions with midazolam sedation has been confirmed in a recent study done in India by Abraham et al.

There were no adverse sequelae and there was cardio-respiratory stability. Addition of opiates to sedative drugs during conscious sedation is known to produce desaturation and hypotension in certain patients. Excessive drowsiness observed in 3 (3.9%) of the patients did not need reversal with flumazenil, a benzodiazepine reversal agent. Most anaesthetic associations have developed guidelines to help provide safe sedation during clinical procedures and this includes the use of monitoring equipment and the provision of an emergency trolley for resuscitation. Unfortunately the endoscopy unit where this study was done does not have any functioning monitoring equipment or an emergency trolley.

CONCLUSION
Midazolam is a safe, effective benzodiazepine that can be used by gastroenterologists for conscious sedation. It also provides favorable conditions for the endoscopist and the high level of amnesia makes repeat endoscopies more tolerable for the patients. The use of top-up titration mode of administration makes its use predictable. The basic monitoring equipment must be provided to make conscious sedation safe for patients. There is a pressing need to educate non-anaesthetists on the technique of conscious sedation to reduce the risks of cardio-respiratory depression and possible aspiration of gastric contents.

REFERENCE:
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