Percutaneous nephrolithotomy in an ankylosing spondylitis patient: Point of view of an anaesthesiologist

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Summary

Background: Ankylosing spondylitis, a chronic and inflammatory disease, is known as a very serious pathology, which basically is the difficulty in airway management and respiratory and cardiac problems in terms of anesthesia. In this case report, we aim to present an uncommon anesthesia experienced in an ankylosing spondylitis patient, who required percutaneous nephrolitotomy due to Staghorn type kidney stone.

Case Report: A 47-year-old heavy smoker male patient who had been diagnosed with ankylosing spondylitis is scheduled for PCNL because of a Staghorn type stone in the left kidney. He has a difficult airway with a Mallampati IV score and pulmonary dysfunction in restrictive type. Due to skeletal deformity, giving a prone-surgical position was also very difficult for the patient.

Conclusions: We decided that for an ankylosing spondylitis patient, PCNL can be a safe surgical approach, if the patient is carefully evaluated preoperatively, if required preparations are made for airway difficulty, and if an attentive anesthesia plan - regarding the patient position in particular and ventilation problems- is applied.

key words: percutaneous nephrolithotomy • Ankylosing spondylitis • difficult airway

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BACKGROUND

Percutaneous nephrolithotomy (PCNL) is a preferred surgical approach particularly in treatment of complex kidney stones such as Staghorn type[1,2]. However, because the PCNL requires the patient in prone position, it necessitates a careful anesthesia administration for patients with respiratory or circulatory problems [1–4].

Ankylosing spondylitis is an chronic, inflammatory disease which primarily affects sacroiliac joints and axial skeleton [5]. It may also cause ankylosis in temporomandibular and cricoarytenoid joints alongside cervical vertebrae, leads to the classification of ankylosing spondylitis among most risky diseases due to considerably difficult management of airway during anesthesia [5,6]. While it has an effect over extraarticular structures such as hungs, aorta, and heart; and leads to serious organ dysfunction with an increasing intraoperative lifethreatening complications.[5–8].

In this case report, we aim to present an uncommon anesthesia experienced in an ankylosing spondylitis patient who required PCNL due to Staghorn type kidney stone.

CASE REPORT

A 47-year-old heavy smoker male patient who had been diagnosed with ankylosing spondylitis 30 years ago, scheduled for PCNL because of a Staghorn type stone in the left kidney (Figure 1). In preoperative anesthesia evaluation, the patient showed rigidity and fixation in the cervical vertebrae, absence of rotational movement in the neck, inability to move head and look straight forward. Moreover, a serious vertebral deformity that resulted in thoracolumbar kyphosis was determined. Due to all those articular pathologies, the patient was already unable to lie at supine and to take surgical position in prone which is required for PCNL. The examination to determine the possible airway problems, showed neck fixed in 45° flexion regarding the neutral position and atlantooccipital extension was not present fortunately temporomandibular joint had mobility. The patient was assessed to have a class IV difficult airway according to Mallampati score. Furthermore respiratory function tests were proved a restrictive type respiratory dysfunction, but cardiac problems were no revealed and routine laboratory tests were within normal limits (Table 1).

After the assessment of high anesthesia risk, cardiac and respiratory parameters of the patient were monitored carefully for the surgery. In general anesthesia protocol, while the patient was put on 100% oxygen inhalation with the help of a mask, deep sedation was performed by repeated doses of 1 mg/kg propofol and totally 1 μg/kg fentanyl, intravenously. The verification of the ventilation via mask and laryngeal mask airway was determined for a possibility of an unsuccessful endotracheal intubation. Because the patient had difficulty to stay at supine position and assume head extension due to ankylosis, endotracheal intubation process presented problems right at the beginning during laryngoscopy. After establishing the optimal head-down position, direct laryngoscopy could be performed with a number 4 laryngoscope blade and during the limited visualization of vocal cords/trachea in the patient evaluated as Mallampati Class IV, oral endotracheal intubation was achieved. After a safe airway management anesthesia induction was maintained with added 2–3 mg/kg propofol and 0.1 mg/kg vecuronium bromide was administered intravenously. After that, 50% O2, 50% N2O and 1–2% isoflurane were applied for anesthesia maintenance. In case of nerve-muscle block, when required, 1–2 mg/IV vecuronium bromide was used in repeated doses. Following the intubation controlled mechanical ventilation was maintained to keep the arterial blood gases in a normal values.

After securing the airway because the patient had no vertebral column flexibility, preparations were made in order to help the patient assume prone position who has been scheduled for percutaneous nephrolithotomy and alongside rou-

| Table 1. The preoperative routine laboratory tests of the patients. |
|-----------------------|----------------------|------------------|
| **Biochemical tests**  | **Results**   | **Normal values** |
| Blood glucose         | 149 mg/dl      | 70–110           |
| BUN (Urea N)          | 19 mg/dl       | 7.00–25.00       |
| Creatinine            | 0.86 mg/dl     | 0.30–1.40        |
| Sodium                | 141 mEq/l      | 130–150          |
| Potassium             | 4.27 mEq/l     | 3.50–5.30        |
| ALT                   | 18.00 IU/L     | 10.00–42.00      |
| AST                   | 16.00 IU/L     | 10.00–60.00      |

<table>
<thead>
<tr>
<th><strong>Complete blood count</strong></th>
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<tr>
<td>Hemoglobin</td>
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Figure 1. Staghorn nephrolithiasis and specific bamboo spine in ankylosing spondylitis.
tine procedures, a horse-shoe headrest was added to the operation table in order to help patient assume prone position. The chest of the patient was supported with more than one pillow and he was given the prone position, however, because vertebrae and the lower extremity skeleton were not in the same level, cruris region was supported with pillows from beneath, as well (Figure 2,3). In a 150 minutes surgical period, removal of all the residual stones were confirmed via fluoroscopy and the patient was extubated in supine position with an adequate spontaneous respiratory effort. He was discharged well on the postoperative 3rd day.

**DISCUSSION**

PCNL was planned in the patient who was diagnosed with Staghorn kidney stone with ankylosing spondylitis history which leads to a high risk of renal calculi formation [1–3,6]. However because of a risk of difficult airway and possible intraoperative respiratory and circulatory problems during anesthesia, a series of preoperative examinations and laboratory studies was performed to reveal the possible medical problems that are already present and issues that can be encountered intraoperatively. Ankylosing spondylitis primarily affects sacroiliac joints and axial skeleton and this condition inflicts serious problems in making the patient assume positions required for the surgery [5,6]. It also causes abnormalities, ranging from mild limitation to total ankylosis in temporomandibular, cricoarythenoid joints and cervical vertebrae, is known to be an even more serious outcome and may lead to fatal complications during general anesthesia in terms of establishing an airway [6,7]. In the patient despite remarkable cervical ankylosis and Mallampati Class IV score, the less involved temporomandibular joint helped to establish an oral opening, though limited, and oral endotracheal intubation was maintained without any help of fiberoptic laryngoscopy following deep sedation in anesthesia begining. At this point, we would like to cite the experience level of the anesthesiologist and the attentive preoperative preparation period as important factors influencing the outcome. However we have to noted that fiberoptic bronchoscopy for awake intubation is the gold standard in ankylosing spondylitis cases.

Pulmonary involvement is a known extraarticular effect of ankylosing spondylitis and it may occur as restrictive pulmonary dysfunction [5,7]. Moreover, involvement of costochondral and costocervical joints limit chest expansion and might lead to aggravation of pulmonary ventilation [5,9]. Besides, in conditions that our patient presented which require prone position and a risk of prolongation of operation duration, the situation might get even worse. At this point, patient being a heavy smoker might have an importance, as well. Just as a restrictive pulmonary failure with chronic obstructive pulmonary disease was established in the patient and complication such as hypoxia or hypventilation was avoided with a controlled mechanical ventilation during the surgery.

Due to skeletal deformity, giving a surgical position was also very difficult in the patient [5,7]. Therefore, a horseshoe head rest was added to the operation table and several pillows were employed in order to keep the vertebral column and lower extremities at the same level. At this point, our main concern was bone fractures. Moreover, risks such as brain edema, ocular injuries, facial hematoma and edema which are associated with position of the patient were monitored closely. After a careful intraoperative follow-up, the surgery was completed without leaving any residual stones and the patient was discharged well without any complications.

**CONCLUSIONS**

In conclusion, we presented a patient who suffered from ankylosing spondylitis and underwent PCNL as an unusual anesthesia experience. Problems like difficult intubation and complications due to position required for PCNL were managed successfully.
REFERENCES: