Little is known about the history of anaesthesia in the period of more than 1000 years between Graeco-Roman times and the sixteenth century when the renaissance started. In Europe, that period is usually referred to as the Dark Ages when no progress was made in medical science. However, the situation in the East was different. Therefore, in this paper, the development of anaesthesia during that period is studied by reviewing the following books: *Al-Hawi fit-tibb, (The Continence)*, *Al-Qanon fit-tibb (The Cannon of Medicine)*, *Al-Tasrif*, *Al-Mukhtarat fit-tibb*, *Al-Onda Fil Al-Jiraha*, and *Al-Tayseeer* by Rhazes, Avicenna, Albucasis, Al-Bagdagi, Ibn El Quff and Ibn Zuhr respectively. Those authors were medical scholars who lived in the period between the ninth and the fourteenth centuries. Their contribution to pain relief has been recently evaluated. In this paper we will evaluate their contributions to anaesthesia and resuscitation.

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Anaesthesia

**Documentation of the use of Al-Murquid**

Both of the historians, Ibn Khalkan in the thirteenth century, and Ibn Katheer in the fourteenth century, documented that Urwa Ibn Al-Zubair in the beginning of the eighth century developed leg gangrene for which amputation was required. The doctors of Khalifa Al-Waleed Ibn Abdel Malek in Damascus offered him Al-Murquid to be put to sleep for the operation.

Literally, the word 'Al-Murquid' in Arabic means a drug that induces deep sleep. Evidence about the popularity of this anaesthetic comes from finding entries about Al-Murquid in four general purpose Arabic language dictionaries compiled during that era.

Also in the literary book *Sayd Ul-Khatir*, Ibn ul Joozi in the twelfth century referred to the anaesthetizing effect of Bhanj.

**Anaesthesia techniques**

Al-Murquid was used either by ingestion or inhalation or rectally. In the form of infusion, they used particular types of solanum, cannabis, opium and mandrake by ingestion. The last three drugs were also administered rectally on a plug which had to be changed hourly. On the other hand, opium, mandrake and henbane were also
used by inhalation in the form of odorants. As wild lettuce has a mild soporific effect it was used, whether fresh or boiled, as an adjuvant to any of the previous ones or in cases of insomnia. They not only precisely determined the required dose of each drug but also they were able to fix the length of time which the anaesthesia was to last with great precision, for example, Ibn Sina gave a dose of one ‘mithkal’ of mandrake for 3–4 hours of general anaesthesia.

However, Ibn El Quff, most probably in an attempt to reduce the dose used, and hence decrease the risks of toxic effects, advised care on the part of the surgeon to use operative techniques that minimized pain.

Anaesthesia personnel
The knowledge and practice of anaesthesia reached its peak in the beginning of the fourteenth century as evidenced in Ibn El Quff’s book on surgery Al-Omda Fil Al-Jiraha (the mainstay in surgery). Unlike Paulus of Aegina, Ibn El Quff gave detailed information in his book on the phenomenon of pain and clearly stated that pain relief during surgery should be the responsibility of a second medical man other than the surgeon performing the operation. Al-Tabaaei (meaning the physician) was to look after pain relief by giving Al-Murquid to allow Al-Jaraaehi (meaning the surgeon) to perform the operation. This represents the first report, in the literature, on the role of the anaesthetist.

Monitoring
In that era they also realized the importance of monitoring during anaesthesia as, according to Sigrid Hunke, a third medical man used to be present putting a finger on the pulse during the operation. It is interesting to note this method of monitoring, by palpating the pulse is still practised nowadays and is referred to in anaesthesia textbooks as a simple non-invasive method.

Resuscitation
Resuscitation team
In the memoirs of Prince Osama Ibn Al-Munquizi we found evidence that the Tabaaei (physician) and Jaraaehi (surgeon) also worked together as a resuscitation team. Both were called for the resuscitation of a warrior who collapsed immediately after an arrow hit him.

Nutrition
For the resuscitation of patients with severe weakness and cachexia due to dysphagia, Ibn Zuhr, in the twelfth century, recommended enteral feeding through a tube made of silver or strengthened tin introduced into the throat gently and gradually, to avoid its nauseating effect. Contrary to his predecessors Ibn Zuhr also advocated rectal enteral feeding and described how the bladder of a goat filled up with the nutrient fluid and fitted with a silver tube tied to its mouth could be used for this purpose.

Management of upper airway obstruction
For the resuscitation of suffocation due to upper airway obstruction Ibn Sina, in the tenth century recommended the introduction of a tube made of gold or silver, or similar metal, to assist breathing. In agreement with Brendt & Georig this represents the first reported use of an endotracheal tube. However, before attempting intubation, Ibn Sina tried conservative measures including clearing the secretions using a wicker stick covered with a piece of cotton-wool. If such measures failed and the patient’s life was threatened, Ibn Sina recommended tracheotomy. According to Adams and Spink & Lewis, in the second century and Caelius Aurelinus in the fourth century did not approve of tracheotomy. Therefore, although Paulus (seventh century) quoting Antyllus (second century), described the technique of tracheotomy, the operations remained in disfavour. This state of affairs lasted until the Islamic era when Al-Razi (ninth century) and later Ibn Sina, (tenth century) spoke favourably of the operation and refined the technique.

Although Al-Razi spoke of tracheotomy as a drastic measure he reported seeing patients with wounds in the throat through which breath came out, yet the wounds eventually healed and patients survived. However, the credit for proving that tracheotomy is not a dangerous operation goes to Al-Zahrawy in the tenth to eleventh century and Ibn Zuhr in the twelfth century. Al-Zahrawy, in his book Al-Tasrif, Liman Ajam An Al-Tasrif reported from his own experience the successful management of a suicidal cut wound of the trachea and concluded that tracheotomy is not a dangerous procedure. On the other hand, Ibn Zuhr’s application of an experimental model to a clinical problem was the forerunner of the method by which many current surgical procedures were developed. The authors who came after Al-Zahrawy and Ibn Zuhr such as Al-Bagdagi and Ibn El Quff recommended tracheotomy unreservedly in life-threatening upper airway obstruction not relieved by other means, and described the technique with more refinements and in more detail. It is interesting to note that Ibn El Quff’s indications for tracheotomy specifically included the failure to introduce cool air to the interior.
Use of bellows
Ibn Abi-Usaybia\textsuperscript{29} in the thirteenth century in his book of medical biographies \textit{Uyunal-Anba Fi-Tabaqat Al-Atibaa} documented a case in which a critically ill patient already pronounced dead was successfully resuscitated by the physician Saleh Ibn Bahlah who elicited that the patient still responded to painful stimuli, then with the use of bellows, insufflated air and soap root powder into his nose. According to Jaser\textsuperscript{30} this clinical case report documented the use of bellows for respiratory resuscitation 900 years before it was first reported in Europe.

The contributions of the above mentioned authors were translated into Latin as early as the middle of the twelfth century\textsuperscript{31} and greatly influenced the European mediaeval schools of medicine well into the eighteenth century.\textsuperscript{2-4,7,31-36}

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