

Military Medicine in the Crusaders' Kingdom of Jerusalem

Eran Dolev MD¹ and Nachshon Knoller MD²

¹Department of Internal Medicine E, Tel Aviv Sourasky Medical Center, and ²Department of Neurosurgery, Sheba Medical Center, Tel-Hashomer, and Sackler Faculty of Medicine, Tel Aviv University, Israel

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Historical background

The Crusades represent one of the most fascinating adventures in western history. Inspired by Pope Urban II at the Council of Clermont on 27 November 1095, thousands of Europeans made their way to the East to liberate the Holy Land from the reign of Islam. After capturing Jerusalem on 15 July 1099 they established a Crusaders' Kingdom in the Holy Land that ruled the country or parts of it for about 200 years, until the fall of Acre on 15 May 1291 [1].

The conquest of the Holy Land and other territories in the Middle East led to an ongoing encounter with the local heterogeneous population. These encounters, which took place in peacetime as well as on various battlefields, left their mark on both societies – the European and the native. Commercial, economic and agricultural relations influenced the daily life and the entire social infrastructure of the area [2].

Medicine was probably the sphere in which the European immigrants benefited most from their contacts with the East, with the Latins (as the Europeans were called) acquiring medical knowledge from the local practicing physicians [3].

European medicine during Medieval times

The main development of European medicine during the Middle Ages began in the eleventh century at the Salerno Medical School in southern Italy. In 1076 the area was conquered by the Normans, which further contributed to the development of this school. As a result of contact with the Arabs of North Africa and Spain, classic Greek medicine returned to Europe [4]. The influence of the medical school at Salerno was the dominant factor in the development of European medicine from the tenth until the sixteenth century [5]. However, during the twelfth and thirteenth centuries, the era of the Crusaders' Kingdoms, Islamic medicine practiced in the East was in many respects superior to western medical practice. Muslim surgery also largely impacted upon surgical practice at Salerno. *Albucasis' Altasrif*: a treatise on the practice of surgery, became the

standard textbook of surgery taught at Salerno and remained so for a long time [6]. Byzantine medicine, which derived from Nestorian medicine in the fourth century, was later influenced by advances in the neighboring Muslim countries. It attained its height during the twelfth and thirteenth centuries, influencing in turn various aspects of medical practice in the Crusaders' Kingdom, especially military medicine [7].

The main culprit for the backwardness of surgery in Christian society was the attitude of the Church. According to Christian thinking of the time, the spilling of blood violated the principle of the sanctity of the human body. At the council of Tours in 1163 for example, the pronouncement "*Ecclesia abhorret a sanguine*" (the church does not shed blood) meant that surgery could no longer be practiced by physicians, who essentially were also clergymen [8]. This view was in contradiction to the church's general attitude to medicine, which was in favor of surgical intervention as reflected in the church's writings: "We would not require the medical art for relief if we were immune to disease." Thus, "The medical art was given to us to relieve the sick, in some degree at least" [5].

Crusader military medicine

The Crusaders' Kingdom lived by its sword and knew few periods of peace. What emerged from their numerous engagements with the Muslims on the battlefield were the development of traumatology and surgery and the organization of military medicine.

The unique innovation of the Crusaders' Kingdom of Jerusalem was the creation of military orders. While most previous monastic orders had dedicated themselves exclusively to the Church, the Knights in the Crusaders' Kingdom, who belonged to several military orders, were committed to the sick and poor. The Order of the Knights of St. John of Jerusalem was established as a charitable institution to care for indigent pilgrims; when the Crusaders captured Jerusalem this organization was already functioning [9].

The first master of the organization, "Blessed Gerard," acquired immediate recognition by Godfrey, the first king of the

Crusaders' Kingdom. The organization became a military order and its members took the vow "to be a serf and a slave to our lords the sick," which meant caring for the sick and poor regardless of race, language or religion [9]. Raymond du Puy was the first to hold the title of Master of the order. He taught the knights that "it did not suffice to live piously and give medical aid to pilgrims" [3].

Considering the continued power of the Muslims and the constant danger still menacing Christian travelers, the Knights of St. John had to be prepared to die, if need be, in defense of the sick, the wounded and the pilgrims [9]. In 1112 King Baldwin I of Jerusalem declared that the Order be called "The Hospital" and its members, the Knights of St. John of Jerusalem, be known as "Hospitallers." He also legalized the status of all possessions owned by the Order in the Kingdom, which were further exempted by the Patriarch of Jerusalem from the payment of tithes. All these efforts were aimed at reinforcing the hospital's medical work among the pilgrims. The Order was recognized by Pope Pascal II in his bull issued in 1113 [9].

Without doubt the greatest achievement of the Order of St. John was the foundation of the hospital in Jerusalem. This facility served as a prototype for several other hospitals [10]. Knights from the aristocracy were also involved in caring for the poor and sick, and the care was given with unstinting devotion and at considerable expense [11]. The hospital's ability to function in the context of military medicine is supported by evidence that after the battle against the Muslims at Tel Gezer (Mongisard) on 25 November 1177, about 750 battle casualties were evacuated from the battlefield and were admitted to the hospital in Jerusalem within 24 hours [9].

There is no direct information regarding the process of diagnosing diseases or the medications that were prescribed for various conditions, since the archives of the orders and of the Kingdom itself were lost. However, several methods were mentioned, all in the tradition of Salerno. Thus, urine examinations were considered to be of great value, although the drinking of water was not thought to be important. Diets were prescribed according to the Salernitan code. Bloodletting was frequently practiced [5]. Several methods can be attributed to Byzantine influence [10]. Doctors serving the sick brothers were usually not members of the religious orders but were outside practitioners [12].

The medical regulations of the order of St. John, which were in the spirit of Salerno, also reveal a close affinity to the medical practice in Muslim hospitals [3,13,14]. The earliest collection of the hospital's rules and regulations has been attributed to the already mentioned Raymond Du Puy, the second master of the Order (1120–1160). In this code only chapter 16 described services provided exclusively for the sick [14]. Later on, around 1181, specific regulations were given by Roger de Moulins, the Grandmaster of the Order at that time. The hospital was divided into wards. Four doctors and four surgeons administered to the sick and were assisted in each ward by nine sergeants (the equivalent of medical orderlies today) [15]. The

medical and humanitarian work done by the Hospitallers was much appreciated, not only by the pilgrims but even by the foe. When Saladin entered Jerusalem in October 1187 after he had won the battle of Hattin, he permitted the brothers of the Order of St. John to care for their wounded until they were able to travel [9].

The Order of the Teutonic Knights was founded during the siege of Acre in 1191. While this Order included German-speaking knights, its goals and the regulations were similar to those of the Order of St. John of Jerusalem. After receiving recognition by Pope Innocentius III in 1199, its hospital was built in Acre [16].

The Order of St. Lazarus was the military order of leper knights. Taking its name from Lazarus, the leper who was cured by Jesus, the knights of this Order devoted themselves to the care of other lepers, but also took upon itself all the obligations and duties of a military order. The Order of St. Lazarus also founded a special hospital located at the northern wall of Jerusalem [17].

The Crusaders at war

The principal weakness of the Crusaders' Kingdom was the lack of manpower. Thus, they were very cautious in warfare, preferring to defend fortified positions than engage in open battle [18]. This strategy is exemplified by their dependence on castles [19], which were well prepared for siege and were manned and equipped accordingly. The knights therein could thus lead a regular albeit communal life, and were ready at any moment to resist an attack or send reinforcements to other castles [20]. Moreover, several castles were organized for tending to battle casualties, although the details are unknown [21]. While the castle strategy was generally the rule, some military engagements demanded that the knights fight in the open, which necessitated charging and tested their battle ability

Siege warfare was popular on both sides – Moslem and Christian. This mode of fighting was more advanced technologically than the usual tactics, but its toll in human lives and injuries was high. Siege warfare meant siege towers, belfries and the use of mines [22,23]. In the siege of Acre for example, the besiegers breached the tower and covered the walls with animal skins soaked in vinegar and mud in order to protect themselves from the boiling water or oil that would be poured down by the castle defenders [22]. During the siege of Arsuf (known today as Rishpon, near Herzliya), the attackers succeeded in destroying a tower that crushed a hundred men inside [23].

The basis of the Crusader army was the armored knight. The knights constituted the body of heavy cavalry that served as the tactical unit for the attack [24]. At the start of an offensive the knights wielded lances, but when it came to hand-to-hand combat they used swords [25]. The Crusaders relied for victory in battle on the mounted charge, however the Muslims were well aware of the importance of neutralizing their enemy's horses. Moreover, the Muslims were light and mobile; they would outflank the Crusaders' units in order to upset their cohesion.

They could achieve this only after killing or wounding the enemy's horses. The Muslims used arrows that were extremely effective in establishing superiority prior to physical contact [26]. In order to overcome the limitations of heavy cavalry facing a highly mobile enemy, the knights' units were augmented by mounted and foot soldiers, among them archers and crossbow men [26].

The heavy armor of the knights, while used extensively in Europe, was far from suitable for the hot climate in this part of the world. In addition to the weight of the armor, the knights suffered great discomfort from the hot metal.

At the level of the combat unit, wounded warriors were attended to by non-combatants on an ad hoc basis. On several occasions the wounded were evacuated from the battlefield by the devoted knights of the military orders to a castle or hospital [27].

The battle of Hattin, which took place in the region of the Lower Galilee on 4 July 1187, serves as an example of an immense military disaster. That battle marked the total destruction of the military power of the Crusaders' Kingdom of Jerusalem, the loss of its capital Jerusalem, and most of its territories. The Muslim victory at Hattin became the symbol of Muslim superiority over the Christians, though the real lesson of the battle could be defined as military incompetence due predominantly to their disregard of the basic principles of military medicine that were certainly known by that time. The Crusader army entered the battlefield, having left the water sources behind them and after a long march that had begun before dawn on a particularly hot day. During the march, long before any real engagement had occurred, the knights' units were attacked from afar by mobile archers whose arrows inflicted injuries to both men and horses. They also burned the fields, causing demoralization and slowing the advance of the heavy units. When at last the knights reached the enemy, both horses and men were thirsty and exhausted. Many of the foot soldiers deserted. The knights who were deprived of the infantry remained exposed to the enemy, unable to charge or fight effectively for their own lives. This disaster was monumental because the Christian army that assembled for the battle at Hattin was one of the largest in the history of the Crusades: most of the 1,200 knights and 10,000 infantrymen who marched into the battle were annihilated [28–31].

War injuries

The weapons used at the time of the Crusades – the lance, the sword and the dagger – were designed to kill. Penetrating wounds of the chest or abdomen were usually lethal, although some victims survived them. Bleeding to death from injuries in the neck region or extremities occurred frequently as these regions were less protected than the others.

The Crusaders used heavy broad swords which, held in two hands, rendered amputations and wide penetrating wounds. In contrast, the Muslims used thinner and longer curved swords with very sharp blades. Held in one hand, these could inflict

deep penetrating wounds. Knights who were thrown from their horses sustained fractures, some of them compound fractures that did not heal easily. In some cases the injured horses fell and crushed their riders to death [32].

The most important historian of the Crusaders' Kingdom of Jerusalem was William the Bishop of Tyre. As an eyewitness to many of the events reported in his book, his descriptions were accurate and his interpretations in accord with the beliefs and attitudes of the time. The books of William of Tyre also contain several descriptions dealing with various aspects of military medicine. The story of King Baldwin I and his injury (July 1103) may serve as an example of early Christian surgical practice [33]:

They were hiding in ambush, but the king fell on them fiercely, killed most of them, and put the rest to flight. One of them, however, as he fled, hurled a javelin that by ill luck struck the king. It entered from behind through the ribs near the heart and just missed dealing a fatal blow. The care of the physicians, however, with their use of incisions and cautery, at length restored Baldwin to some degree of health, but at certain times, ever after he suffered a recurrence of trouble from his wound.

Also recounted by William was the use of smoke as a military weapon and the suffocation that it caused [34], a case of heart injury caused by an arrow [35], and cases of multi-trauma and fractures during the use of siege tactics [36]. He reported the results of falling from a horse, such as fractures to limbs [37] or to the skull. It is not difficult to deduce the diagnosis of a skull fracture from his description of otorrhea [38]. William was well aware of the importance of water, and that its lack should be taken into account when planning for battle [39]. He wrote about the possible causes of epidemics in the military setting, such as might result from unburied corpses [40]. He also recommended the steps to be taken when an epidemic disease affected the army, namely, isolation of the sick [41]. William of Tyre mentioned the use of stretchers for medical evacuation from the battlefield, but one cannot conclude from the text whether stretchers were used for any injured soldier or were exclusively reserved for injured knights and nobles [42–45].

Perhaps the first recorded case of post-traumatic stress disorder may be attributed to Count Stephen of Blois, as evidenced by his behavior before the siege of Antioch as compared to his conduct and attitudes after [46].

The heritage of Crusader medicine

The impact of Crusader medicine on European health professions was quite significant. The Latins in the Holy Land learned from the Muslim doctors about preventing diseases, a concept utterly unknown in the West. For example, Gilbertus Anglicus, who participated in the third crusade wrote a book in which he emphasized the issue of hygiene, a subject he had learned from the writings of the great Muslim physician Rhazes.

Hugh of Lucca, known also as Hugo Borgogni, was a surgeon who participated in the fifth crusade as a member of the Italian expedition. During the siege of Damietta he had the

opportunity to attend to many battle casualties and became an expert in treating fractures. It is likely that his military experience influenced his attitude against suppuration as an essential step in the process of wound healing. Hugo did not leave any written medical works. However, his pupil Theodoric of Cervia (1205–1298) wrote and published *Chirurgia* in 1267, a book considered to reflect Hugo's ideas on antiseptics and debridement [47]. Theodoric was also credited for using sponges saturated with narcotic substances to obtain anesthesia during operations [48].

In closing, we would like to emphasize the major influence that the Military Orders of the Crusader's Kingdom and their hospitals had on European medicine. During the thirteenth century and later, hospitals began to be established in Europe, playing an essential role in many European communities. Both the prevalent concepts of hospital organization and the professional attitudes are seen to closely resemble those of the original institutions founded by the knights in the East.

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Correspondence: Dr. E. Dolev, Dept. of Internal Medicine E, Tel Aviv Sourasky Medical Center, 6 Weizmann St., Tel Aviv 64239, Israel. Phone: (972-3) 697-3705, Fax: (972-3) 697-4655, email: dalia96@netvision.net.il

Erratum.

In the article "Bolus high dose interleukin-2 for the treatment of malignant melanoma" by Pappo et al., which was published in the March issue (2001;3:169–73), the two panels of Figure 1 were inadvertently transposed. The bottom figure labeled B should be the top figure and labeled A, and the top figure should be the bottom figure and labeled B.