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Necropsy reports and anatomo-pathological observations from the archives of the Grand Ducal Medici family of Florence. Part I - The 16th century

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Abstract. During the Renaissance and Early Modern Age dissection began to be practiced for medico-legal purposes, in order to investigate the causes of death. In particular, during the 15th century evidences of autopsies performed by doctors on their private patients emerge. These dissections were requested by those families who can afford the expenses, in order to search the possible presence of hereditary diseases and to predispose a prevention and cure. The diffusion of this practice is attested also by the work of Antonio Benivieni (1443-1502), who is considered a pioneer of the pathological anatomy. The extremely rich documentary archives of the Medici family, one of the most important family of the Italian Renaissance, report several description of necropsies carried out on the bodies of the members of the family. The analysis of these reports offers important direct information on the autopsy practices performed by court surgeons of the members of an aristocratic class in a period comprised between the 16th and the first half of the 18th century, and allows in some cases also to propose a retrospective diagnosis on the diseases that afflicted the Medici. In this paper the analysis will be focused on the evidences about autopsies carried out during the 16th century. An evolution through time can be observed, as from the first very brief notes at the beginning of the period the reports become more detailed and accurate at the end of the century.

Key words: Renaissance, Medici, autopsy, embalming, court surgeons

Introduction

During the Renaissance and the Early Modern Age, the opening of a corpse began to be performed privately on request of the families in order to examine the internal organs and to investigate the causes of death. The subjects of these autopsies belonged to high or aristocratic classes and were patients of scholarly doctors or lettered surgeons; their reports consisted in brief texts describing individual cases and not all provide a theoretical explanation on the causes of death. In several cases, the physicians and the surgeons who practiced the autopsy had cured the dead during their life; consequently, the documents referred also the description of the symptomatology suffered by the patient before the death (1). These autopsy practices should be distinguished from the public dissections and the anatomical research, whose subjects were criminals, condemned or poor patients of hospitals.

The Medici have been one the most powerful families of Italian Renaissance, accumulating vast wealth through banking, commerce and skillful political ventures. The extremely rich archival documents of the Medici family of Florence, whose corpses were submitted to autopsy after death, refer in several cases details about the clinical history of the main person-

ages and the report of the necropsy performed by the court surgeons.

The results of the analysis of the autopsy registers can be compared with the information provided by paleopathological and osteoarchaeological studies performed on the skeletal remains of some members of the Medici family, exhumed from their tombs in the Basilica of San Lorenzo in Florence. Indeed accurate examination of the skeletons revealed evident signs of autopsy practices such as horizontal and oblique craniotomies, longitudinal and transversal cuts of the sternum, and sectioning of the sternal extremities of the ribs (2).

Materials and methods

The majority of information about the Medici family deriving from archival documents and written sources are collected in the fundamental work of the Florentine physician and historian Gaetano Pieraccini (1864-1957) wrote in 1924 and reprint in 1986. These documents provide relevant information about the practice of autopsy carried out on the bodies of the Medici family for medico-legal purposes in a time range comprises between two centuries that is when the Medici sovereigns of Tuscany were nominated Grand Dukes. The period examined begin from the first half of the 16th century, when the death of Giovanni dalle Bande Nere and Maria Salviati, parents of Cosimo I, Patriarch of the Grand-ducal branch of the Medici, occurred, and when attention to the pathological anatomic study of corpses began to flourish and the necropsy reports started to be descripted. The information end with the first half of the 18th century, when the branch of the Medici extinguished because of the death, without heirs, of Giangastone, the last Grand Duke.

In this work, the autopsy reports of the members of the family who lived within the 16th century will be analyzed according to a chronological order based on the year of death. For many members of the noble family there are detailed 'clinical records' of diseases occurred during life, but no autopsy reports are mentioned, so they will be excluded from our dissertation.

Giovanni dalle Bande Nere (1498-1526) and Maria Salviati (1499-1543)

Documentary sources are silent about a possible embalming or autopsy on the corpse of Giovanni delle Bande Nere, famous condottiero and father of Cosimo I, the first Grand Duke of Tuscany. The circumstances of his death (the amputation of a leg) probably prevented the surgeons to open the body. In fact, the skeletal remains of Giovanni present no traces of craniotomy nor of thoracotomy (3, 4).

Maria Salviati, wife of Giovanni dalle Bande Nere and mother of Cosimo I, died at the age of 44. A letter of Campana, Secretary of Cosimo, to Pierfrancesco Riccio, the majordomo, asks instructions "about the opening of the Maria's corpse" (5, 275). Nevertheless, analyses carried out on the skeletal remains of Maria evidenced no traces of autopsy practices; probably the body was open without to produce cuts in the bones.

Eleonora from Toledo (1522-1562)

Written sources attest that Eleonora from Toledo, the wife of Cosimo I, contracted tuberculosis at the age of 30 and was consumpted by the disease until her death, caused by an attack of pernicious malaria (6). She was submitted to autopsy, which ascertained that "her illness was caused by a damaged lung and from long time" (7). This short sentence shows the scarce propensity of the doctors to properly describe the organs, in fact it is not listed any specific pattern of the pulmonary parenchyma, but only a generic damage. The lungs of Eleonora, chronically exposed to the disease, probably presented some typical aspects of tuberculosis, such as caseous necrosis, pleural adhesions, calcific nodules or parenchymal scars. Other omit aspects may have been congestion, oedema or emphysematous changes. The doctors did not even report the simplest and most basic data such as the exterior appearance of the lungs, their consistency and their colour.

Skeletal remains of Eleonora do not shows traces of craniotomy nor thoracotomy.

Giovanni (1543-1562) and Garzia (1547-1562)

According to written sources and to paleopathological investigations, Giovanni and Garzia, the two sons of Cosimo I and Eleonora, died of malaria (4;, 8). In fact, in October 1562, Cosimo, Eleonora and their children, Giovanni, Garzia and Ferdinando, visited the marshy Maremma country near Grosseto, where malaria was endemic. On their way back to Florence, Eleonora and all the sons suffered from sudden irregular bouts of fever. They died in a time span of three weeks and the only survivor was Ferdinando, who later become Grand Duke. Written sources wrote about Giovanni that "once dead, [the physicians] opened the corpse and found all the internal organs very beautiful" (9, 131). This finding is compatible with a death for malaria, whose lesions were not detectable in that time at the sole macroscopic examination. Written sources are silent about a possible autopsy on the corpse on Garzia.

Paleopathological examination of the skeletal remains of Giovanni and Garzia revealed no traces of craniotomy nor thoracotomy.

Cosimo I (1519-1574)

Cosimo I, 1st Grand Duke of Tuscany, died at 55 years of age for "catarrhal fever", to be interpreted as bronchopneumonia. In the written sources, the autopsy of Cosimo is thus justified: "The physicians, in order to surely know the cause of his disease, and to prevent the onset of corrupted smells from the body, opened it" (10, 672). Nevertheless, no other information about the autopsy are reported. The skeletal remains of Giovanni only present traces of craniotomy.

Giovanna of Austria (1548-1578)

The first wife of Francesco I, Giovanna of Austria, survived six troubled deliveries, but died because of the seventh childbirth at the age of 30 for the rupture of the uterus. The description of the Grand Duchess labor is very detailed. On April 9, after the first throes, a shoulder of the foetus appeared, but the midwife instead of facilitating the childbirth, attempted to put inside the arm, then the newborn died. Then Giovanna expelled the placenta, with great stupor of the physicians. A surgeon attempted to pull out the foetus, but unsuccessfully, and at 5 in the morning of April 10 Giovanna died. The day after her death "that was Friday, she was opened, and the child was found outside the uterus, and the cervix was ragged […]. The rest of the body was badly disposed, as she had the spine distorted in the shape of a S […]; she had the liver hard and white, without blood, the stomach thin like a veil, the lungs hanged upon the chest and inflamed, in the rest she was fine" (11). This report attests a detailed autopsy, aimed at investigating the thoracic and abdominal cavities and organs, revealing uterus rupture with fetus in abdominal cavity and scoliosis of the column; the stomach seems affected by atrophic gastritis and the liver by hepatic fibrosis.

Anthropological examination of the skeletal remains of Giovanna demonstrated absence of craniotomy, but evidenced a cut in the sternum.

Don Filippino (1577-1582)

Don Filippino was the seventh child and eldest son of Francesco and Giovanna. The cause of his death could be referred to an acute infectious disease, as death was preceded by fever. After death the "Prince was opened and the skull was found full of water, the lung hard and arid in several part, and the liver discoloured and similar to a cork; generally in all the body there was very little blood, so that the physicians judged that he was very ill and he could survive very little" (11). In another report, we can read: "The same physicians who cured him, sawed the head, removing the skullcap, where they found under the first layer [i.e. the *dura mater*], over the brain, almost a glass of water. Which they thought and believed that it was the real cause of his death. Then they found, once open the body, the liver spongy and hard, and every other things healthy and beautiful" (9, 215). In the crypt of Giangastone two children were found corresponding to the age at death of Filippino, but the identification was sure thanks to the presence of craniotomy in one of the children. Furthermore, the cranium exhibited

an enlargement of the vault, indicating that the child was affected by a non-severe hydrocephaly, caused by rickets (12); this finding corresponds to the description of the court physicians who found an accumulation of liquor in the head of don Filippino. There is a clear link between the macroscopical aspect of the liver and the rickets, which is a well-recognized complication of chronic liver disease in adults and children (13). Two different sources described the liver of Filippino as hard, pale and spongy: these aspects could be pathognomonic of a chronic liver disease. Prolonged intra and extra hepatic bile ducts injuries in children as a result of inflammatory, autoimmune, genetic, structural, drug induced and metabolic disorders may cause cholestatic liver disease (CLD) (14) even though viral hepatitis seems the leading cause in children, among which prevalence of chronic Hepatitis C was highest (15). The most frequent symptom of the CLD is the recurrent severe fever, that in fact troubled Don Filippino for his entire (short) life, so much to be defined sickly and delicate. One of the complications of chronic liver diseases is osteodystrophy (like rickets) which is reported in 9-83% of cases due to decreased intestinal absorption of minerals and impaired hepatic hydroxylation of vitamin D (16).

The presence of the clothes prevented total recovery of skeletal remains; however, it was possible to examine the ribs and the sternum by in situ X-ray, which did not reveal signs of cuts.

Francesco I (1541-1587)

Francesco I, 2nd Grand Duke of Tuscany, died of pernicious malaria at 46 years of age, after a deer hunting in the marshy Arno river valley, with his second wife, Bianca Cappello, who died with the same symptomatology 24 hours later (8). The court physicians report a detailed description in Latin of the autopsy of Francesco. We report the English translation: "The corpse of the Serenissimo Francesco de' Medici, second Grand Duke of Tuscany, was opened and examined after twelve hours from the death and these things were found. Little muscles appeared under the fat, in fact all parts of the abdomen were very fat. The stomach was very thin and frail in consistency, and its upper part was very red and inflamed, and occupied a not small part of the viscera, and this color in the median part was more intense and reddish; inside the stomach, a small amount of "chylous" material was present, as derived from chewed food and liquids recently eaten. With regard to the kidneys, the right looked a bit softer, otherwise both the right and the left were good as much as the ureters and bladder; neither renelle nor stones were found; the spleen had a natural aspect, but the liver was absolutely in poor conditions. It appeared brown in color with compact consistency, and it was so hard that it was not possible to dissect it in the right way. The gallbladder was much larger than normal, and so full of bile to appear swollen and relaxed. In the veins, as appeared from the sections, there was not much blood. After opening the chest, the heart appeared intact and divided in the natural way. The lungs, on the contrary, were completely in decay: the external portion was almost completely sprinkled with scattered yellow, white, reddish, greenish and blue spots, and these colors appeared pathological. The internal part (of the lungs) did not show these spots, but was colored in dark red, almost black" (11).

From the anatomo-pathological point of view, the description is very accurate and allows a retrospective clinical picture, starting from several details. The body of Francesco had a scarce muscular mass and a large quantity of fat. Even though the condition of the organs were heavily compromised by hypostasis and cadaveric decomposition (as it happened for the stomach and for the spleen), the liver seems affected by hepatic fibrosis while the lungs of the Grand Duke showed acute inflammatory pleuritis.

Examination of the skeletal remains of Francesco showed that craniotomy was not practiced, whereas a cut in the sternum demonstrates the sternotomy. In the modern practice of the adult autopsies this procedure is no longer performed because it is preferable the thoracotomy method, that is the removal of the chest wall by inserting the costotome into the chest at the lower edge of the rib cage and then cutting across the musculature and cartilagineous tissues along the lateral face of the chest and towards the manubrioclavicular junction (17). This allows avoiding cutting on the hard bone and therefore operating on the soft cartilage that is easily dissectable.

Discussion

In Antiquity, the autopsy performed on human bodies is a practice attested very rarely. The father of ancient medicine, Hippocrates, did not dissected human corpses; the only exception is represented by the Alexandrian physicians Erasistratus and Herophilus, who in the Hellenistic times performed autopsies for their studies on anatomy and physiology. After them, this practice was abandoned, and the anatomical studies of Galen (2nd century AD) were based only on dissections of animals (18). Dissection for anatomical studies and teaching reappeared in the Western world with the work of Mondino de' Liuzzi (ca.1270-1326) in Bologna who, in 1315, performed his first public dissection in the presence of medical students and other spectators. From this moment, dissections were incorporated into the medical curriculum in the universities. The autopsy practice of Mondino followed a precise procedure, which he described in his fundamental *Anathomia*, intended as a practical "manual" that remained the reference text until the 16th century. The dissection was based on the division of the human body in three distinct parts: the head, the chest and the abdomen. The abdomen had to be opened first, because it contains the less noble and more putrescible organs; then you had to go to the chest, leaving to last the head, which contains higher and more complex anatomical structures. The abdominal cavity was opened through an incision practiced from the epigastrium to the pubis, while the description of the procedure to dissect the skull is less detailed and suggests a practice still rudimentary (19).

However, anatomical dissections should be distinguished from autopsies performed for medico-legal purposes. Sporadic cases of "forensic" autopsies on human bodies in the Western world are recorded starting from the Middle Ages. Roger Bacon (1214?-1294) and Arnold of Villanova (1235-1312) recommended the study of the dead body but did not mention any personal experience. The first recorded case in Italy of a human body being opened for inspection dates from 1286 in Cremona, when an epidemic among humans and hens occurred. The chronicles of Fra Salimbene, a Franciscan friar, refers that a physician, after having opened a hen and found an abscess at the tip of the heart, opened a man who had died apparently of the same disease and found a similar lesion (20, 21). Another significant case occurred in 1302 in Bologna, when Azzolino degli Onesti was open by a commission of two physicians and two surgeons, among whom there was Bartolomeo da Varignana, following the request of the judge, in order to rule out a poisoning as cause of death (22). Therefore, at the beginning of the 14th century in Bologna the practice of autopsy to determine the cause of death was framed in a forensic context; in fact a team of respected doctors was appointed in order to judge in cases of suspected murder, in particular poisoning, initially through external inspection, and then through opening the body (23). The practice of autopsy for assessment of the causes of death at the beginning of the 14th century paved the way to the anatomical demonstrations on the cadavers for didactic purposes. The example of Bologna was followed by several other cities and, in the course of the 14th century, the practice of autopsy became increasingly common. As an example, at the appraisal of the terrible epidemic of Black Death of 1348 the communes of Florence and Perugia paid doctors to open the bodies of several people who had succumbed to the disease (23).

As for the city of Florence, the anatomical dissection was regulated by precise rules contained in the Statuti of 1387 (24). Already in 1399, the autopsy practice is mentioned in the *Tractatus de nobilitate legume et medicinae,* composed by Coluccio Salutati, Florentine secretary and humanist (25).

If such cases are relatively infrequent in the 14th century, in the 15th century evidences of dissections performed by doctors on their private patients emerge. These dissections were requested by those families who can afford the expenses, in order to investigate the possible presence of hereditary diseases and to predispose a possible prevention and cure. Among others, we refer two evidences for the city of Florence. In 1486, Bartolomea Rinieri died and her husband writes in his *Ricordanza*: "Early in the morning my wife Bartolomea died at the age of 42 or thereabouts. She died of uterine disease; this caused a flux which had lasted about 18 months and which no doctors could cure. She asked me to have her autopsied so that our daughter or others could be treated. I had this done, and it was found that her uterus was so calcified that it could not be cut with a razor" (23). Similarly, a Florentine judge

asked to the physician Bernardo Torni to autopsy his young son: "… for the sake of the other children, I think that to have seen his internal organs will be of the greatest utility" (23).

The diffusion of this practice in Florence is attested also by the work of Antonio Benivieni (1443-1502), who is considered the father of the pathological anatomy. His *De abditis nonnullis ac mirandis morborum et sanationum causis*, published posthumous in 1507, illustrates a series of cases in which autopsy is fundamental in order to discover the causes of death or to study the anatomical and physiological changes determined by diseases. Benivieni correlated the symptoms of the patients with the alterations of the organs. This text demonstrates the diffusion of the autopsy practice in Florence during the 15th century (25).

There were still strong religious and social objections to the autopsy, but slowly the point of view started to change, also for the church. In 1410, Antipope Alexander V died suddenly with suspicion of venom and was autopsied by Pietro D'Argelata. He performed the autopsy, and then reported, in an accurate description, how he had found no suspicious sign in the corpse. Finally, he handled the embalming according to the principles contained in his work *De custodia corporis mortui* (Trat. XIII-lib. V). Pope Sixtus IV (1471-1484) in 1482 issued a bill permitting studies on human bodies by students at Bologna and Padua (26), and Clement VII (1523-1534) confirmed this privilege. In 1556 Ignatius Loyola, founder of the Jesuit order, was autopsied. Stones were found in the kidneys, bladder, and gallbladder (27). It therefore appears that by this time autopsy was fully accepted also by the Catholic Church.

It should be remembered also Leonardo da Vinci (1452-1519), who carried out autopsies on a limited number of corpses in the first decade of the 16th century in S. Maria Nuova Hospital of Florence; nevertheless, they were not practiced for anatomo-pathological purposes, but for his curiosity toward the human body (25).

Finally, in 1543 Andreas Vesalius published his fundamental *De humani corporis fabrica* (1543) brought considerable contributions to science, for example made it possible to distinguish the abnormal from the normal anatomy and began the criticism toward the Galen authority, demonstrating several errors in his anatomy.

It is difficult to reconstruct the procedures followed by the physicians, as detailed written accounts are rare before the 15th century. The description of the surgeons is generally conditioned by their knowledge of human anatomy and by the prevailing theories of their time. Firstly, the only macroscopic observation could not perceive what is visible with modern instruments, in particular the microscope, and secondly, the physician saw what he expected to find, according to his conceptual background. The degree of accuracy of the reports greatly varies from one case to another: often the dissection ceased as soon as the pathologist thought to have found the cause of death; however, sometimes the physician described the state of the main internal organs in a more systematic approach (27).

In general, the evidences registered at autopsy represented a category undetermined or very imprecise. The attention was concentrated on elements such as the presence of a corruption, fluids unusual or in excess or changed in colours, in accordance of the Hippocratic humoral theory still prevailing. However, a noteworthy problem was represented by the difficulty in distinguishing the changes referable to the *post-mortem* processes of putrefaction from the pathological lesions (1).

The autopsy records reported for the members of the Medici family during the 16th century reflect this framework. Explicit references to a medico-legal purpose of the autopsies in order to investigate the causes of death in the documentary sources can be inferred in the case of Cosimo I and Don Filippino. Furthermore, another reference is reported in a letter of June 9, 1547 when the courtier Don Pedro de Toledo brings Cosimo I and Eleonora the news of the death of their son Pedricco (August 7, 1546 – June 9, 1547). Cosimo orders an autopsy of the child's body: "He [Cosimo] ordered that the beautiful little corpse were opened so that they could see how it was inside" (28).

As for the 'progenitors' of the Grand Ducal line, namely Giovanni dalle Bande Nere and Maria Salviati, we do not have any necropsy reports. For the condottiero Giovanni, figure of great importance, we have no signs of autopsy on the skeleton and it seems that no investigation has been carried out even though he died

for wounds in battle. For his wife Maria instead we have news of her embalming, but nothing is narrated of the technique or what is examined or studied on her body. This fact betrays the little sensibility and attention on the autopsy studies in the first half of the 16th century. The bodies of the nobles of the Medici family were treated with great regard and care, so that the corpse would not undergo decomposition and could be exposed, for example, during the sumptuous burial. However, this attention did not turn into a scientific interest; in fact, the study of the organs was totally ignored.

Some autopsy reports of the first Grand-ducal generation constituted by Cosimo I, his wife Eleonora of Toledo and their children have been handed down, but still show certain superficiality and inaccuracy. The descriptions in fact are very sparse, dismissive and incomplete. It seems that the doctors did not perform the autopsy according to a pre-established methodology, and they wrote down only what struck them most. The most detailed descriptions are oriented to the quantifications of liquids, or humors, which betrays what the medicine of the time was still anchored to the theories of Hippocrates and Galen.

The situation changes with the next generation, in fact the report of the investigation on the body of Francesco I is clearly distinguished from the previous as length, precision and meticulousness. According to the dictates of Mondino de' Liuzzi, the corpse is dissected first at abdominal level and then to the thorax. All the organs are analyzed, the parenchymas are cut and the contents of structures like the kidneys and the gallbladder are investigated. The autopsy on Giovanna of Austria was performed with the same precision, and the doctors correctly identified the rupture of the uterus as the final cause of death. It is from this period that we have the first description of an autopsy performed on a child, Don Filippino (5 years old), who is treated as an adult corpse. It is also the first description of a complete investigation of the skull, with a precise examination of the meninges and the brain.

Conclusions

The analysis of the archival documents of the Medici family permitted to infer relevant information about the autopsy practices performed on the bodies of aristocratic personages of the 16th century. An evolution through this century can be appreciated, as from the first evidences consisting in very brief reports the relations became with time more accurate and detailed with correct considerations about the causes of death and even the description of an autopsy carried out on the corpse of a child.

References

1. Siraisi N. Segni evidenti, teoria e testimonianza nelle narrazioni di autopsie del Rinascimento. Quaderni Storici 2011; 108:719-44.
2. Giuffra V, Fornaciari A, Minozzi S, Vitiello A, Fornaciari G. Autoptic practices in 16th-18th century Florence: skeletal evidences from the Medici family. Int J Paleopathol 2016; 15:21-30.
3. Fornaciari G, Bartolozzi P, Bartolozzi C, Rossi B, Menchi I, Piccioli A. La riesumazione di Giovanni dalle Bande Nere (1498-1526): primi risultati paleopatologici. Archivio per l'Antropologia e la Etnologia 2013; 143:156-70.
4. Fornaciari G, Giuffra V, Bianucci R. Identificazione di agenti patogeni in serie scheletriche antiche: l'esempio della malaria dei Granduchi de' Medici (Firenze, XVI secolo). Med Secoli 2010; 22 (1-3):261-272.l.
5. Conti C. La prima reggia di Cosimo I de' Medici nel Palazzo già della signoria di Firenze: descritta ed illustrata coll'appoggio d'un inventario inedito del 1553 e coll'aggiunta di molti altri documenti. *G.* Firenze: Pellas Editore; 1893.
6. Bianucci R, Giuffra V, Bachmeier B, Ball M, Pusch CM, Fornaciari G, Nerlich A. Eleonora of Toledo (1522- 1562): evidence for tuberculosis and leishmaniasis co-infection in Renaissance Italy. Int J Paleopathol 2012; 2:231-5.
7. Galluzzi RJ. Istoria del granducato di Toscana sotto il governo della Casa Medici. Firenze: Cambiagi; 1781.
8. Fornaciari G, Giuffra V, Ferroglio E, Bianucci R., Malaria was "the killer" of Francesco I de' Medici (1531-1587). Am J Med 2010; 123(6):568-9.
9. Lapini A. Diario fiorentino. Firenze: Corazzini;1900.
10. Cantini L. La vita di Cosimo de' Medici. Firenze: Albizzini; 1805.
11. Pieraccini G. La stirpe dei Medici di Cafaggiolo, vol. 2. Firenze: Nardini Editore; 1986.
12. Castagna M, Giuffra V, Fattori S, Vitiello A, Caramella D, Giustini D, Fornaciari G. Rickets at the Medici court of Florence: the case of Don Filippino (1577-1582). Med Secoli 2014; 26(3):753-66.
13. Kooh SW, Jones G, Reilly BJ, Fraser D. Pathogenesis of rickets in chronic hepatobiliary disease in children. J Pediatr 1979; 94(6):870-4.
14. Balistreri WF, Heubi JE, Suchy FJ. Immaturity of the enterohepatic circulation in early life: factors predisposing to

"physiologic" maldigestion and cholestasis. J Pediatr Gastroenterol Nutr 1983; 2(2):346-54.
15. Tahir A, Malik FR, Ahmad I, Akhtar P. Aetiological factors of chronic liver disease in children. J Ayub Med Coll Abbottabad 2011; 23(2):12-4.
16. Mohammadi B, Najafi M, Farahmand F, Motamed F, Ghajarzadeh M, Mohammadi J, Eshagh Roze M. Prevalence of vitamin D deficiency and rickets in children with cholestasis in Iran. Acta Med Iran 2012; 50(7):482-5.
17. Kim Savarna S. Atlas of adult autopsy. A guide to modern practice. Springer*;* 1st ed. 2016.
18. Nutton, V. Ancient Medicine. London: Routledge; 2004.
19. Crivellato E, Ribatti D. Mondino de' Liuzzi and his Anathomia: A milestone in the development of Modern Anatomy. Clin Anat 2006; 19:581–7.
20. Greco E. Studi e richerche su Fra Salimbene da Parma descrittore nella sua cronica della prima necropsia fatta a scopo anatomopatologico nel 1286. Minerva Med 1961; 52:3361-4.
21. Busacchi V. Necroscopie trecentesche a scopo anatomo-patologico in Perugia. Rivista di Storia della Medicina 1965; IX: 160-4.
22. Artelt W. Die altesten Nachrichten über die Sektion menschlicher Leichen im mittelalterlichen Abendland. Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften 1940; H XXIV: 1-25.
23. Park K. The Criminal and the Saintly Body: Autopsy and Dissection in Renaissance Italy. Renaiss Q*.* 1994; 47:1-33.
24. Nardi MG. Statuti e documenti riflettenti la dissezione anatomica umana e la nomina di alcuni lettori di medicina nell'antico 'studium generale' fiorentino. Rivista di storia delle scienze mediche e naturali 1956; 47:237-49.
25. Costa A, Weber G. L'inizio dell'anatomia patologica nel Quattrocento fiorentino, sui testi di Antonio Benivieni, Bernardo Torni, Leonardo da Vinci. Archivio De Vecchi per l'Anatomia Patologica 1963; 39:429-878.
26. Carlino A. La fabbrica del corpo. Libri e dissezione nel Rinascimento. Torino: Giulio Einaudi Editore; 1994.
27. King LS, Meehan MC. A history of autopsy. A review. Int J Paleopathol. 1973; 73:514-44.
28. Archivio di Stato di Firenze, Miscellanea Medicea, fil. 48, n. 22.

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