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Case Report: An Exploration of Cadaveric Anatomical Anomalies

Madison Haggard, Noah LaBruyere, Vy Nguyen, Rylie Shook, Wyatt Turner* and Yazen Zaben

Department of Structural and Cellular Biology, Tulane University School of Medicine, New Orleans, Louisiana 70112, USA. * Corresponding Author: Wyatt Turner. Department of Structural and Cellular Biology, Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, Louisiana 70112. Email: wturner6@tulane.edu

ABSTRACT

In the gross anatomy laboratory at the Tulane University School of Medicine, our group of six Anatomy Master's Degree students observed several anatomical and pathological findings in a female cadaver. The dissectors were provided with dissection equipment including forceps, hemostats, blunt probes, and scalpels to study the cadaver. Some notable discoveries included severe scoliosis, an ossified lumbar mass, extensive abdominal adhesions, a duodenal stent, a biliary stent, a hysterectomy and oophorectomy procedure, and medical devices such as a subclavian chemotherapy port and ureteral stents. The scoliosis appeared to be caused by the ossified mass spanning the length of her lumbar spine. Histopathological analysis revealed osteoid tissue which indicated a possible diagnosis of osteosarcoma. The subclavian chemotherapy port was found in the supine position within the right superior thoracic region, leading us to speculate a malignant nature of the lumbar mass. During abdominal dissection, reflection of the anterior abdominal wall was difficult due to the many abdominal adhesions found throughout the peritoneal cavity. The greater omentum was unable to be observed due to the adhesions. Dissection of the intraperitoneal organs revealed abnormal coloration of the gallbladder and cystic duct. After identifying the organs of the gastrointestinal tract with multiple intestinal adhesions, a duodenal stent was revealed in the descending duodenum. A second stent was identified in the bile duct, suggesting that it had been placed to alleviate biliary obstruction or pancreatitis due to complications of the duodenal stent placement. During the pelvic cavity dissection, the dissectors noticed a complete hysterectomy and oophorectomy. It is unknown whether the procedure was done to prevent further complications in the treatment of the lumbar mass, or if it was done prior to the formation of the lumbar mass. Dissection of the retroperitoneal space revealed that both kidneys had no anatomical variations, but ureteral stents were found in the renal pelvises of both kidneys. The ureteral stents traveled through the ureters and entered the urinary bladder. Using a literature review, the dissectors explored possible links between these findings.

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Introduction

Cadaver dissection became prevalent in the United States in 1745 with the first formal course in anatomy at the University of Pennsylvania. Back then, cadavers were obtained from executed criminals or graves [1]. This continued until a series of laws were enacted in each state that provided unclaimed bodies to anatomists and medical schools, such as the Massachusetts Anatomy Act of 1831 [2]. The unclaimed bodies composed most of the cadavers used for medical education until the Uniform Anatomical Gift Act was passed in 1968 [1]. This allowed for the donation of human bodies and organs after death at the donor's request [3]. Since then, Willed Body Programs have provided the most bodies for cadaver dissection in medical schools [4]. In recent years after COVID-19, more U.S. medical schools have been cutting down on anatomy course hours and supplementing cadaver dissection with online programs and models [5].

While taking the gross anatomy course and cadaver dissection at Tulane University School of Medicine, a group of six Anatomy Master's Degree students observed many notable findings that were suggestive of a complicated medical history for the cadaver. The cadaveric dissection was done on an anatomical female of unknown age in the following order: back, thoracolumbar laminectomy, spinal cord, upper and lower limb, thoracic cavity, abdominal cavity, pelvic cavity, pelvic bisection, and head and neck. The notable findings in the order they were observed were

severe scoliosis, a lumbar ossified mass, chemotherapy port, abdominal adhesions, stitches in the ileum, oversized stomach, duodenal and biliary stents, discolored gallbladder and cystic duct, bilateral ureteric stents, pelvic adhesions, absence of the uterus and ovaries, meningeal mass, subarachnoid hemorrhage, and calvarial erosion. These findings are presented in the order of discovery, and we provide our speculations of their causes based on relevant literature.

Case Findings

Back and Spinal Cord Dissection

Severe Thoracolumbar Scoliosis

Immediately upon placing the cadaver in the prone position for the back dissection, we noticed severe scoliosis in the thoracolumbar transition zone of the spinal column. Our dissection began with a skin incision in the midline from the occipital region towards the coccyx. After the skin reflection process was completed, the superficial back muscles were then reflected bilaterally to reveal deep musculature and the erector spinae muscles. These muscles were then removed from vertebral levels from the fourth thoracic vertebra to the third sacral vertebra (T4-S3). As the dissection proceeded distally, the muscles were carefully detached from the vertebral column to expose the laminae. The laminectomy commenced with the use of the osteotome to cut the left and right laminae of the vertebrae.

Large Ossified Mass in the Lumbar Spine

As the laminectomy procedure proceeded inferiorly into the lumbar spine, approximately at the level of the second lumbar vertebra (L2), much more resistance was met with the mallet and osteotome than in the thoracic vertebrae. Initially, we thought this could be related to the severe scoliosis noted above. As muscular reflections continued inferolaterally to the spinous processes of the lumbar vertebrae, a roughly softball-sized ossified mass was noted. The mass was interdigitated with the fibrocartilaginous discs of the lumbar spine. The mass extended inferiorly to the sacral promontory and bilaterally over the posterior one-third of the iliac crest, approximately one to two inches on both sides of the spine. This was determined to be the reason for the spinal deviation. A sample of the ossified mass was submitted to the Pathology Laboratory at the Tulane University School of Medicine for tissue sectioning and staining with hematoxylin and eosin (H&E). The tissue section appeared histologically resemblant to a sample of normal bone due to its presence of osteoid matter. This led us to speculate a potential pathological diagnosis of osteosarcoma; however, we remained skeptical and continued to find clues.

Despite the sigmoidal deviation in the lumbar spine of the cadaver, many of the associated structures appeared normal and anatomically unremarkable. The muscles of the erector spinae group, the spinalis, longissimus, and iliocostalis were well-kept intact and did not appear to be fibrotic or necrotic. Spinal cord structures such as the dural sac, cauda equina, and filum terminale internum and externum did not appear to be affected by the mass [6].

Breast, Axillary, and Upper Limb Dissection

Subclavian Port

After the skin incisions were made by the dissectors, the skin was elevated and reflected to remove the underlying subcutaneous tissue and breast tissue. During the dissection, a chemotherapy port was identified by the dissectors within the right superior thoracic region, situated deep into the subcutaneous fascia. All other related structures of the upper limb, axillary region, and pectoral region appeared normal and were clinically unremarkable. Musculature, vasculature, and the brachial plexus presented bilaterally as they typically would.

Abdominal Dissection

Abdominal adhesions and Small Bowel Resection

Before the skin incisions were made on the abdomen, a scar was noted in the midline. The muscles of the anterolateral abdominal wall appeared normal. The linea alba on the anterior abdominal wall appeared stretched. The anterior abdominal wall was then reflected to reveal the peritoneum and peritoneal cavity. This anterior abdominal wall reflection was made difficult by many abdominal adhesions throughout the peritoneal cavity. Due to this, a distinct greater omentum was unable to be identified. Upon reflection, the intraperitoneal organs were observed, and stitches were found in two separate locations in the ileum. The liver was identified in the upper right quadrant and appeared normal. The gallbladder was identified along the inferior border of the liver in the midclavicular line. The gallbladder and corresponding cystic duct did not appear green. The gallbladder color was muted and seemed to be filled with mucus upon examining its contents. The stomach was identified in the left upper quadrant and ap-

peared larger than expected for the cadaver's size. The spleen was identified posterior to the stomach and appeared normal. The cecum and ascending colon appeared normal, and the appendix was not present.

Duodenal Stent/Biliary stent

While identifying the various components of the gastrointestinal tract, a metallic duodenal stent was discovered within the descending duodenum. Shortly thereafter, a second stent was discovered in the bile duct. These unexpected findings prompted the dissectors to investigate the underlying cause and medical necessity of the interventions. The literature search revealed that duodenal stent placement (DSP) using self-expandable metallic stents (SEMs) is commonly employed to manage symptoms of malignant gastric outlet obstruction syndrome (MGOO), a condition that impairs normal stomach emptying. MGOO can result from malignant or benign disorders, as well as motility dysfunctions affecting gastric function. Further review of the literature suggested a connection between MGOO, and the cadaver's previously noted spinal mass and severe scoliosis, leading to the conclusion that her cancer was most likely the cause of the obstruction [7]. Another possibility for DSP was to prevent severe vomiting caused by chemotherapy of the lumbar osteosarcoma, as DSP could facilitate stomach emptying.

Duodenal stent placement can lead to complications such as pancreatitis and biliary obstruction at the major duodenal papilla. This might be the reason for the biliary stent placement (BSP), a procedure performed to alleviate biliary obstruction and pancreatitis after DSP (BPAD) [8].

Retroperitoneal Dissection

Following the reflection of all abdominal organs, the structures of the retroperitoneal space were able to be observed. Of these, the paravertebral sympathetic ganglia and prevertebral sympathetic ganglia appeared normal and unaffected. Additionally, we noticed no anatomical variations in the branches of the descending abdominal aorta, the inferior vena cava, or their respective branches that supply blood to the abdominopelvic structures.

Ureteral Stent

The kidneys were discovered in the retroperitoneal space near the transverse processes of T12-L3 vertebrae. Both kidneys appeared to be normal in size, with the right kidney slightly lower than the left, due to the anatomical position of the liver. The outer surfaces of both kidneys were free of any cysts or renal adenomas. Furthermore, the suprarenal glands were normal and showed no signs of benign or malignant tumors. The vasculatures supplying the kidneys were visualized well and presented with no unusual anatomical variations. Once the kidneys were dissected out, the hila and their structures, renal artery, renal vein, and renal pelvis were evaluated. The renal pelvis of each kidney contained a ureteral stent that traveled through the ureter and entered the urinary bladder. The ureters of the human body work to drain urine from the kidneys to the bladder. If the ureter becomes blocked, the kidneys are filled with urine and swell, leading to kidney damage and potential kidney failure. To fix the blocked ureter, a stent must be placed inside the ureter. The ureteral stent differs from the ureteral catheter in that a ureteral stent is placed into the body for long-term drainage and to keep the ureter open. Ureteral stents are used to fix a drainage problem and are replaced every 3-6 months. A ureteral catheter is typically temporary and used during a specific surgical procedure. While the ureteral stent runs from the renal pelvis to the bladder, a ureteral catheter remains mostly in the urinary bladder, attached to a urine drainage bag.

The findings within the retroperitoneal space reveal that the patient suffered from an obstruction that disrupted the urine drainage from the kidneys to the urinary bladder. This could have been caused by cancerous masses that spread to retroperitoneal space. Moreover, ureteral stents work to alleviate any pain and improve overall kidney function during illness.

Pelvic Cavity Dissection

As the dissection continued towards the pelvic cavity, the urinary bladder could be observed anteriorly. To study the pelvis more in-depth, the pelvis was bisected to show a midsagittal view of its contents.

Total Hysterectomy

Upon opening the pelvic cavity of the anatomically female cadaver, we noted that a complete hysterectomy and oophorectomy procedure had been performed on the cadaver. The cause of this surgical procedure is unknown. Additionally, it is unknown whether the procedure was performed to prevent the onset of other various complications related to the lumbar osteosarcoma or whether it was done before the development of the lumbar tumor.

Pelvic adhesions

Upon midline sectioning of the pelvis, the internal iliac artery and its anterior and posterior divisions were observed. These branches were difficult to isolate and identify due to pelvic adhesions and fibrosis despite having no anatomical anomalies once being identified.

Intracranial Dissection

Meningeal Mass

Toward the end of the course, we performed a craniectomy procedure on the cadaver to study intracranial anatomy in depth. Following the removal of the calvaria, we immediately noted a mass attached to the meningeal dura mater along the midline of the brain where the superior sagittal sinus was. The mass was roughly two centimeters in width, three centimeters in length, and one centimeter in height, which was located near the junction of the bilateral postcentral gyri and superior parietal lobules [6] Following this discovery, the brain was excised from the skull at the level of the medulla oblongata to be analyzed for additional masses and abnormalities. No other masses were noted on the external anatomy of the brain or meninges. The mass was preserved upon bilateral reflection of the meningeal dura mater and remained attached to the midline of the dura along with the falx cerebri.

Subarachnoid Hemorrhage

In the space between the arachnoid mater and the pia mater, we noted some residual blood immediately surrounding the mass, extending out roughly two centimeters circumferentially. No other extradural, subdural, or subarachnoid hemorrhage was noted upon examination of the brain and meninges.

Calvarial Erosion

Upon examination of the internal surface of the calvaria, erosion of the bone matter was identified around the location of the meningeal mass. The erosion was palpated and observed when held up to a light source. Thinning of the parietal bones was noted to be one-to-two millimeters in depth and of similar length and width to the mass.

Discussion

As stated in the case presentation above, these findings are listed in the order that the cadaver was dissected in the one-year gross anatomy laboratory, designed for first-year medical students as well as Anatomy Master's Degree students. At the beginning of the year, students were placed into a lab group consisting of six people to work on one cadaver. The students were provided with dissection equipment including forceps, hemostats, blunt probes, and scalpels to help anatomize the cadaver. The dissectors did not know the name, age of death, cause of death, or any of their cadaver's medical history. Instead, they were tasked to analyze the different systems of the human body in a way that allowed the students to develop a deeper understanding of anatomical structures and variations. Through hands-on dissection, students can learn and investigate the structures and physiological functions of the body, to understand the overall anatomy and disease mechanisms to gain medical knowledge. This cadaveric case report paints the picture of unique anatomical and pathological connections and offers valuable insights into them. Specifically, there are connections between severe thoracolumbar scoliosis, ossified bony masses of the lumbar spine, widespread abdominopelvic adhesions (likely due to metastases of the lumbar osteosarcoma), and various surgical interventions. The collection of these findings allowed our group to explore the connectedness of these anomalies and investigate potential etiologies, clinical implications, and challenges associated with them in the postmortem setting.

Following the lumbar laminectomy procedure conducted in the laboratory, it was determined that severe scoliosis was likely a secondary manifestation of the large, ossified mass found in the lumbar spine which was interdigitated with its fibrocartilaginous discs. Histopathological examination revealed the presence of osteoid tissue in the unknown mass, suggesting a potential diagnosis of osteosarcoma. However, although osteosarcoma is the most prevalent form of primary malignant bone cancer, only 3% to 5% of reported cases occur in the spine [9]. The presence of a chemotherapy port in the right subclavian region of the cadaver implies the existence of cancer therapy for osteosarcoma in the lumbar spine [10].

We determined that the mass's interdigitation with the spinal column structures is ultimately what contributed to the significant deviation noted. Scoliosis associated with spinal tumors, while uncommon, has been documented and typically presents with asymmetric growth and vertebral deformity [11]. Furthermore, the absence of fibrotic or necrotic tis-

sue in the erector spinae muscles indicates a chronic pathology as well as a gradual adaptation to the curvature of the spine.

Once the cadaver was turned to the supine position and the presence of a right subclavian chemotherapy port was noted, we determined that the cadaver underwent systemic cancer treatment at some point in her life. This identification supported our hypothesis of the malignant etiology of the large, ossified mass found in the lumbar spine. Chemotherapy ports are used for a variety of applications such as drawing blood, administering intravenous fluids, or administering contrast solutions for medical imaging techniques; but they are mostly used for long-term administration of chemotherapeutic agents used to treat various forms of cancers [12]. The combination of scoliosis, large ossified spinal column mass, and chemotherapy port suggests a complex clinical history that could have produced paraneoplastic syndromes due to malignancy, bone metastasis of another form of cancer, or primary osteosarcoma involving the lumbar spine [9, 10, 13].

Following the thoracic dissections, our group transitioned to intra-abdominal dissection. We began by making a sagittal cut along the linea alba immediately inferior to the xiphoid process of the sternum, continued inferiorly, circumvented the umbilicus, and continued to the pubis. Abdominal wall musculature, connective tissue, and subcutaneous adipose tissue appeared clinically unremarkable. Beginning to reflect the anterior abdominal wall contents, we noticed that significant portions of the small bowel were adhering to the transversalis fascia deep to the rectus abdominis and transversus abdominis muscles [6].

The extensive abdominal organ adhesions and adhesions of the pelvic contents, combined with the observed evidence of a small bowel resection procedure, suggest prior abdominal surgery. This surgery or surgeries were likely performed due to cancer-related complications such as bowel obstruction or metastasis [14]. Adhesions are a commonly noted postoperative complication that is frequently observed in patients with a history of extensive abdominal surgery [15]. The lack of a distinct greater omentum is consistent with chronic inflammation or surgical removal, possibly related to cancer spread or resection to alleviate bowel obstruction [16]. Through research, we determined that the resection procedure was likely caused by complications related to adhesions caused by metastases of the lumbar osteosarcoma, since cancers of the small intestine account for only about 5% of gastrointestinal cancers in all reported cases [16, 17]. Finally, the presence of midline abdominal scarring supports all other findings, indicating that a laparotomy was likely performed in the cadaver's lifetime [18]. A laparotomy procedure is an investigative or surgical opening of the anterior abdominal wall that serves many functions in gastrointestinal surgery [18]. Additionally, we were able to conclude that the small bowel resections could potentially be due to tumor invasions, ischemic bowel segments due to adhesions, or complications related to chemotherapeutic treatment [14-17, 19].

The presence of a duodenal stent in the descending portion of the duodenum suggests a history of obstructive pathology or as a remedy to prevent severe emesis due to chemotherapy. At this point in our pathological discoveries, we had determined that the stent was likely put in place secondarily to malignancy. Through our research, we learned that duodenal stents are commonly used as a remedy for the condition of Malignant Gastric Outlet Obstruction (MGOO) to maintain luminal patency for the passage of digestive contents. One of the main causes of MGOO is malignant, late-stage cancers which at this point in the dissection, we determined as highly likely [7]. The presence of this stent further confirmed our hypothesis of a complex oncologic history, potentially involving metastasis to the gastrointestinal tract.

Moreover, the discovery of a biliary stent suggests a history of biliary obstruction leading from the gallbladder to the duodenum. Due to the complex clinical history of the cadaver, this stent could have been placed because of secondary malignancy to metastatic cancer, primary hepatobiliary malignancy, or blockage of the major duodenal papilla by the duodenal stent [6-8, 20]. Furthermore, this finding is consistent with the observation of an uninflamed, mucus-filled gallbladder, which would likely have been caused by chronic obstruction, or cholecystitis because of biliary stasis [21], or due to the biliary stent draining the bile directly into the duodenum without entering the gallbladder. Stenting of the bile duct is a common practice used to manage bile duct obstructions caused by malignancies or strictures as commonly seen in the major duodenal papilla with the placement of a duodenal stent [8]. Biliary stenting is an important palliative intervention in cancer patients to prolong and improve the quality of life at the disease's late stages [22].

Our cadaver also presented with a total hysterectomy and bilateral salpingo-oophorectomy, which are commonly performed in cases of malignancies, such as ovarian or endometrial cancer, or as preventative measures for cancer metastasis [23]. The dense pelvic adhesions we found additionally support a history of chronic pelvic inflammation, which was most likely secondary to prior pelvic oncologic surgeries or complications of chemotherapy [24]. While the indication of the cadaver's hysterectomy and bilateral salpingo-oophorectomy remains unknown, it can likely be linked to a broader oncologic pathology suggested by the presence of a chemotherapy port, extensive abdominal adhesions, duodenal and biliary stents, pelvic adhesions, and ossified mass of the lumbar spine.

The relationship of the pelvic adhesions to the vascular branches of the common iliac arteries and veins is complicated, however. The pelvic adhesions indicated a fibrotic response of the cadaver's body to some stimulus, but it did not affect the overall structure of the external and internal iliac arteries and veins and their respective branches. It is impossible to determine whether the function of these vascular structures was impaired in the postmortem dissection, but the fibrotic changes of the pelvis and perineum can be linked to reactions to cancer treatments, chronic pelvic inflammation, or peritoneal metastasis.

The presence of bilateral ureteral stents, much like the duodenal and biliary stents, indicates a history of chronic obstruction. As discussed in many of the pathological findings, the necessitation of the ureteral stents was likely caused by retroperitoneal fibrosis, metastatic cancer, or chemotherapy-induced strictures of the ureters [25-27]. Mostly used in malignancy-related obstructions, ureteral stents maintain renal function and relieve hydronephrosis [28]. However, in the case of our cadaver, the stents likely mitigated the effects of retroperitoneal fibrosis, pelvic adhesions, or retroperitoneal invasion by the underlying malignancy. In literature, ureteral stents are commonly used when there is a risk of obstructive nephropathy which is frequently observed in cancer patients with cancers of the pelvis or retroperitoneum [29]. Additionally, the stents require periodic replacement, meaning that the cadaver was experiencing ongoing management of urinary tract obstruction prior to death.

In the final stages of the cadaveric dissection, our group identified a well-demarcated meningeal mass attached to the dura mater along the midline at the superior sagittal sinus, near the junction of the bilateral postcentral gyri and superior parietal lobules [6, 30]. This type of lesion is highly suggestive of meningioma, which is the most common type of primary intracranial neoplasm. These tumors originate from arachnoid cap cells and most frequently occur near dural venous sinuses due to their abundance of arachnoid granulations [31]. Additionally, meningiomas are documented to induce hyperostosis or erosion of the adjacent bone tissue depending on growth patterns. In this instance, the internal surface of the parietal bones adjacent to the mass demonstrated thinning and focal erosion, directly corresponding to the dimensions of the mass. These findings are consistent with other literature noting pressure-induced bone remodeling often seen in progressive intracranial lesions [32]. Surrounding the mass, a localized subarachnoid hemorrhage was noted, without any other evidence of hemorrhage in the cranial vault. Potential etiologies for this hemorrhage could be vascular fragility or disruption of subarachnoid vessels adjacent to the mass or increased intracranial pressure due to edema caused by the mass, with both etiologies representing phenomena observed in both benign and atypical meningiomas with peritumoral vascular proliferation or invasion [33]. The absence of other intracranial masses, paired with the mass's midline location and associated hemorrhage, supports a diagnosis of solitary meningioma with a hemorrhagic complication. However, given the complex pathological and oncological discoveries of the cadaver, it is necessary to note that the differential also includes dural-based metastasis as a secondary malignancy. We could not rule out the possibility that the meningeal mass was a metastasis of the lumbar osteosarcoma. Histopathological analysis would be necessary to determine the nature of the tumor and whether it was a primary meningioma or a secondary metastasis of another form of cancer.

Conclusion

This cadaveric study reveals numerous anatomical findings through hands-on dissection. The students thoroughly investigated every system of the body along with their structures. Through specific analysis of this female cadaver, the dissectors identified significant anatomical anomalies including scoliosis, an ossified mass in the thoraco-lumbar spine, multiple stents in different regions of the body, a chemotherapy port, abdominopelvic adhesions, and various intracranial pathologies. Furthermore, the

cadaver presented with no uterus, revealing that a hysterectomy and bilateral salpingo-oophorectomy were performed. Finally, a meningeal mass associated with hemorrhage was discovered upon removal of the calvaria. These findings reveal that the individual suffered from oncological conditions as well as complex gastrointestinal obstructions, affecting overall quality of life. With more research in dissection and medical advancements, interventions can be taken to assist in improving surgical procedures and patient care for those with complicated medical histories and anatomical variations.

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References

1. Tward AD, Patterson HA. **From Grave Robbing to Gifting: Cadaver Supply in the United States.** *JAMA*. 2002;287(9):1183-. doi: 10.1001/jama.287.9.1183-JMS0306-6-1.
2. Hulkower R. **From Sacrilege to Privilege: The Tale of Body Procurement for Anatomical Dissection in the United States**. *Einstein Journal of Biology & Medicine*. 2011;27(1).
3. Sadler AM, Jr., Sadler BL, Stason EB. **The Uniform Anatomical Gift Act: A Model for Reform**. *JAMA*. 1968;206(11):2501-6. doi: 10.1001/jama.1968.03150110049007.
4. Garment A, Lederer S, Rogers N, Boult L. **Let the Dead Teach the Living: The Rise of Body Bequeathal in 20th-Century America**. *Academic Medicine*. 2007;82(10):1000-5. doi: 10.1097/ACM.0b013e318149e986. PMID: 00001888-200710000-00020.
5. Shin M, Prasad A, Sabo G, Macnow ASR, Sheth NP, Cross MB, et al. **Anatomy education in US Medical Schools: before, during, and beyond COVID-19**. *BMC Med Educ*. 2022;22(1):103. doi: 10.1186/s12909-022-03177-1. PMID: 35172819; PMCID: PMC8851737.
6. Netter FH. **Netter Atlas of Human Anatomy: Classic Regional Approach-Ebook**: *Elsevier Health Sciences*; 2022.
7. Troncone E, Fugazza A, Cappello A, Del Vecchio Blanco G, Monteleone G, Repici A, et al. **Malignant gastric outlet obstruction: Which is the best therapeutic option?** *World J Gastroenterol*. 2020;26(16):1847-60. doi: 10.3748/wjg. v26.i16.1847. PMID: 32390697; PMCID: PMC7201143.
8. Kaneko J, Ishiwatari H, Asakura K, Satoh T, Sato J, Ishikawa K, et al. **Biliary obstruction and pancreatitis after duodenal stent placement in the descending duodenum: a retrospective study**. *BMC Gastroenterol*. 2022;22(1):257. doi: 10.1186/s12876-022-02333-7. PMID: 35597896; PMCID: PMC9123653.
9. Feng D, Yang X, Liu T, Xiao J, Wu Z, Huang Q, et al. **Osteosarcoma of the spine: surgical treatment and outcomes**. *World Journal of Surgical Oncology*. 2013;11(1):89. doi: 10.1186/1477-7819-11-89.
10. Sutcliffe P, Connock M, Shyangdan D, Court R, Kandala NB, Clarke A. **A systematic review of evidence on malignant spinal metastases: natural history and technologies for identifying patients at high risk of vertebral fracture and spinal cord compression**. *Health Technology Assessment*. 2013;17(42):1. doi: 10.3310/hta17420. PMID: WOS:000324928500001.
11. Creze M, Ghaouche J, Missenard G, Lazure T, Cluzel G, Devilder M, et al. **Understanding a mass in the paraspinal region: an anatomical approach**. *Insights into Imaging*. 2023;14(1):128. doi: 10.1186/s13244-023-01462-1.

12. Teichgräber UK, Pfitzmann R, Hofmann HA. **Central venous port systems as an integral part of chemotherapy**. *Dtsch Arztebl Int*. 2011;108(9):147-53; quiz 54. doi: 10.3238/arztebl.2011.0147. PMID: 21442071; PMCID: PMC3063378.
13. Gale RP. **Paraneoplastic Syndromes Merck Manual Professional Edition**: *Merck Manual;* 2024 [updated 2024/08; cited 2024]. *Available from*: https://www.merckmanuals.com/professional/hematology-and-oncology/overview-of cancer/paraneoplastic syndromes.
14. Kessler NG, Franz M. **Surgical Resection of Metastatic Malignant Small Bowel Obstruction**. *Cureus*. 2022;14(7): e27421. doi: 10.7759/cureus.27421. PMID: 36051730; PMCID: PMC9420050.
15. Welle NJ, Sajjad H, Adkins A, Burns B. Bowel Adhesions. StatPearls. **Treasure Island (FL)**: *StatPearls Publishing LLC*.; 2025.
16. Ariake K, Yokoyama S, Doi T, Takemura S, Kajiwara T, Kuroda F. **Effect of omentum removal on the risk for postoperative adhesive small bowel obstruction recurrence: A case-control study**. *International Journal of Surgery*. 2015; 13:27-32. doi: https://doi.org/10.1016/j.ijsu.2014.11.031.
17. Brüggmann D, Tchartchian G, Wallwiener M, Münstedt K, Tinneberg HR, Hackethal A. **Intra-abdominal adhesions: definition, origin, significance in surgical practice, and treatment options**. *Dtsch Arztebl Int*. 2010;107(44):769-75. doi: 10.3238/arztebl.2010.0769. PMID: 21116396; PMCID: PMC2992017.
18. Rajaratnam N, Okoye E, Burns B. Laparotomy. StatPearls. **Treasure Island (FL)**: *StatPearls Publishing LLC*.; 2025.
19. Akbarali HI, Muchhala KH, Jessup DK, Cheatham S. **Chemotherapy-induced gastrointestinal toxicities**. *Adv Cancer Res*. 2022; 155:131-66. doi: 10.1016/bs.acr.2022.02.007. PMID: 35779873; PMCID: PMC10033220.
20. Afshar M, Khanom K, Ma YT, Punia P. **Biliary stenting in advanced malignancy: an analysis of predictive factors for survival**. *Cancer Manag Res*. 2014; 6:475-9. doi: 10.2147/cmar.S71111. PMID: 25525389; PMCID: PMC4266254.
21. Ridtitid W, Karuehardsuwan J, Faknak N, Piyachaturawat P, Vongwattanakit P, Kulpatcharapong S, et al. **Endoscopic Gallbladder Stenting to Prevent Recurrent Cholecystitis in Deferred Cholecystectomy: A Randomized Trial**. *Gastroenterology*. 2024;166(6):1145-55. doi: 10.1053/j.gastro.2024.02.007. PMID: 38360274.
22. Dy SM, Harman SM, Braun UK, Howie LJ, Harris PF, Jayes RL. **To stent or not to stent: an evidence-based approach to palliative procedures at the end of life**. *J Pain Symptom Manage*. 2012;43(4):795-801. doi: 10.1016/j.jpainsymman.2011.12.269. PMID: 22464354; PMCID: PMC4696003.
23. Dominguez-Valentin M, Crosbie EJ, Engel C, Aretz S, Macrae F, Winship I, et al. **Risk reducing hysterectomy and bilateral salpingo-oophorectomy in female heterozygotes of pathogenic mismatch repair variants: a Prospective Lynch Syndrome Database report**. *Genet Med*. 2021;23(4):705-12. doi: 10.1038/s41436-020-01029-1. PMID: 33257847; PMCID: PMC8026395.
24. ten Broek RPG, Issa Y, van Santbrink EJP, Bouvy ND, Kruitwagen RFPM, Jeekel J, et al. **Burden of adhesions in abdominal and pelvic surgery: systematic review and metanalysis**. *BMJ: British Medical Journal*. 2013;347: f5588. doi: 10.1136/bmj. f5588.
25. Sali GM, Joshi HB. **Ureteric stents: Overview of current clinical applications and economic implications**. *International Journal of Urology*. 2020;27(1):7-15. doi: 10.1111/iju.14119.
26. Cristian S, Cristian M, Cristian P, Constantin G, Savu C, Huri E, et al. **Management of idiopathic retroperitoneal fibrosis from the urologist's perspective**. *Ther Adv Urol*. 2015;7(2):85- 99. doi: 10.1177/1756287214565637. PMID: 25829952; PMCID: PMC4372523.
27. Oh S-J, Ku Jh, Byun S-S, Lee Sw, Jeon Hg, Kim Hh. **Systemic chemotherapy in patients with indwelling ureteral stenting**. *International Journal of Urology*. 2005;12(6):548-51. doi: https://doi.org/10.1111/j.1442-2042.2005.01089.x.
28. Sali GM, Joshi HB. Ureteric stents: **Overview of current clinical applications and economic implications**. *International Journal of Urology*. 2020;27(1):7-15. doi: 10.1111/iju.14119.
29. Artiles Medina A, Laso García I, González Tello F, Álvarez Rodríguez S, Hevia Palacios M, Mata Alcaraz M, et al. **The challenging management of malignant ureteral obstruction: Analysis of a series of 188 cases**. *Curr Urol*. 2024;18(1):34-42. doi: 10.1097/cu9.0000000000000183. PMID: 38505156; PMC10946639.

30. Haines DE, Willis MA. **Neuroanatomy atlas in the clinical context: structures, sections, systems, and syndromes:** *Lippincott Williams & Wilkins*; 2024.
31. Louis DN, Perry A, Wesseling P, Brat DJ, Cree IA, Figarella-Branger D, et al. **The 2021 WHO Classification of Tumors of the Central Nervous System: A Summary**. *Neuro Oncol*. 2021;23(8):1231-51. doi:10.1093/neuonc/noab106. PMID: 34185076; PMCID: PMC8328013.
32. McCulley TJ, Jordan Piluek W, Chang J. **Intracranial pressure and skull remodeling**. *Saudi Journal of Ophthalmology*. 2015;29(1):57-62. doi: doi.org/10.1016/jsjopt.2014.12.003.
33. Behling F. **Brain-Tumor Interface, Brain Invasion, and Peritumoral Edema in Meningiomas: Pathology-Clinical Implications**. In: Maiuri F, Del Basso De Caro M, editors. **Meningiomas: From Pathology to Clinics**. *Cham: Springer Nature Switzerland*; 2024. p. 89-97.