

# Operating Room Nurses' Role in Multidisciplinary Surgical Coordination for a Patient with a Large Abdominal Tumor and Multiple Pelvic Fractures

Jing Wang\*, Yanshu Wei, Xin Zhao, Xuejing Li, Jin Pei, Wei Zhang

Peking University People's Hospital, Beijing 100044, China

\*Corresponding author: Jing Wang, wj2965@126.com

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**Abstract:** In this study, we have summarized the coordination of operating room nurses participating in the multidisciplinary team in diagnosing and treating a patient with a large abdominal tumor and multiple pelvic fractures. To perform surgical treatment on patients with various conditions, it is crucial to consider the patients from a holistic perspective. Thus, the existing medical model has shifted from a “disease-centered” approach focusing on single-disciplinary diagnosis and treatment, to a “patient-centered” approach that involves multiple disciplines in diagnosis and therapy. Operating room nurses, as crucial collaborators of surgeons, should make necessary adjustments to enhance their comprehension of patients, improving the overall quality of surgical coordination.

**Keywords:** Operating room nurses; Multidisciplinary team; Surgical coordination

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## 1. Introduction

Ovarian cancer is a malignant tumor that develops in the ovaries. Surgical treatment is a crucial factor in patients' prognosis, serving as the primary form of treatment. The differences in lesions and physical status of patients with different tumors often bring multidisciplinary challenges. Thus, delivering thorough and top-notch diagnoses and treatment strategies within the “specialist doctors treating specialist diseases” framework is challenging. The contemporary medical paradigm has transitioned from a single-discipline approach to diagnosing and treating diseases, known as “disease-centered,” to a multi-disciplinary approach that focuses on the patient, known as “patient-centered.”

The multidisciplinary team (MDT) follows a diagnostic and treatment paradigm where medical professionals from different departments meet at a designated time and location to discuss individual patients. Each participant is allowed to independently express their opinions regarding the diagnosis and treatment of the patients. The MDT often includes various specialties, such as cancer surgery, internal medicine, imaging,

pathology, radiation, psychology, nutrition, nursing, and others<sup>[1-3]</sup>. The multidisciplinary team engages in discussions based on the physical and mental conditions, underlying diseases, tumor sites, invasion scope, and development trends of different patients. These discussions aim to enhance communication and collaboration among professionals from various disciplines. The team works together to develop personalized, high-quality diagnosis and treatment plans, as well as surgical strategies for patients. Ultimately, this approach aims to improve the quality of life for patients<sup>[4]</sup>. Hence, it is imperative for operating room nurses, who play a crucial role in medical collaboration, to possess distinct capabilities in surgical collaboration with patients, particularly those with complex medical conditions. This is essential to cater to the diverse surgical requirements of patients, enhance the overall quality of medical collaboration, and boost patient satisfaction. Currently, the prevailing MDT diagnosis and treatment method in China involves a team of doctors in the clinical department and an in-house team of nurses, as described in multiple studies<sup>[5-7]</sup>. Only a few operating room nurses are involved in the preoperative discussions held by the multidisciplinary clinical diagnosis and treatment team. There have been reports examining the impact of medical cooperation on postoperative satisfaction. In this study, the operating room nurses formed a multidisciplinary team in the department. They engaged in preoperative discussion and surgical collaboration for a patient with a sizable abdominal tumor and multiple pelvic fractures, drawing from their participation in the preoperative discussion of the gynecology multidisciplinary team. The synergy effect was significant, resulting in a high level of satisfaction with the medical care provided.

## 2. Basic patient information

The patient is a married 76-year-old female of Han ethnicity. During a medical examination at another institution six years ago, the patient was diagnosed with an adnexal mass but did not receive any treatment. The patient experienced abdominal distension two months ago, which progressively deteriorated, and did not seek medical evaluation. The patient experienced an unintentional fall six days ago and reported pain in the pubic bone, as well as difficulty lying in a horizontal position. Consequently, she sought medical care at the hospital on August 26, 2022. A color ultrasound revealed the presence of uterine fibroids with calcification, as well as impure cystic masses with multilateral septum in the bilateral adnexal region. The mass located in the left adnexa was an impure cystic mass measuring 19.1 cm x 18.7 cm x 14.4 cm in dimension, with an incomplete envelope. The patient was hospitalized on August 31, 2022, for further evaluation and treatment of multiple impure cystic edema in the right adnexal area with an incomplete envelope, peritoneal metastasis, significant fluid accumulation in the abdomen and pelvic cavity, and fractures in the transverse processes of the right pubis, sacrum, and lumbar segment 5.

The patient had symptoms of frequent urination, thin stool, no wheezing or chest tightness, no abdominal pain, and no vaginal bleeding. Since the disease began, the patient has maintained a regular eating pattern, experienced sleep disturbances, and has not experienced any notable fluctuations in body weight. Her height and weight are 150 cm and 66 kg, respectively. The patient has been experiencing hypertension for almost two decades. She is undergoing oral treatment with “Luohuoxi” (amlodipine) and her blood pressure is maintained at approximately 150–160/100 mmHg. The patient has been experiencing chronic bronchitis since childhood, with intermittent episodes, and has been receiving treatment with symptomatic medications. The patient had no prior surgical procedures, traumatic events, blood transfusions, or allergic reactions. Patients lead a conventional lifestyle devoid of any deficiency in physical exercise and other detrimental living behaviors.

The contrast-enhanced CT scan revealed an aneurysmal dilation at the bifurcation of the right internal carotid artery, subcutaneous lipoedema on the right chest wall, and a fold of the left 9th rib in the

cervical thoracoabdominal pelvic cavity. The bilateral adnexal region exhibited a substantial cystic space. Cystadenocarcinoma was considered to be of significant size, with peritoneal metastases and extensive fluid accumulation in the abdomen and pelvic cavity. The patient has uterine fibroids with calcification, as well as fractures in the bilateral transverse processes of the right upper and lower ramus of the pubis, sacrum, and lumbar fifth segment. Preliminary diagnosis: (1) Pelvic mass, (2) Ascites, (3) Uterine leiomyoma, (4) Hypertension, (5) Fracture (rib fracture, pubic fracture, sacral fracture, lumbar L5 fracture), and (6) Internal carotid artery aneurysm.

### **3. Consultation opinions of MDT rounds**

- (1) Consultation opinion of the radiology department: The patient had a huge pelvic mass. Based on the imaging examination, it was determined that the tumor was not closely connected to the surrounding intestine. Moreover, the patient had an increased amount of ascites. Therefore, the probability of a malignant mass could not be excluded.
- (2) Consultation opinion of the respiratory department: The patient had a history of bronchitis and had no indications of chest tightness, difficulty in breathing, or coughing. Her oxygen saturation level (SpO<sub>2</sub>) was measured at 98%. The patient has undergone pulmonary function testing, and the results indicate that the lung function is within normal parameters. It is imperative to proactively communicate the potential hazards of surgical anesthetics to the patient and their family. If there are issues during the perioperative period, pneumonia may develop. Before surgery, it is essential to provide the anesthesiologist with a detailed account of the patient's medical history. Furthermore, it is crucial to carefully monitor and regulate the administration of muscle relaxant medications and the duration of the surgical procedure. Following the surgical procedure, it is important to ensure that the airway remains clear and unobstructed, and efforts should be made to promote the expulsion of sputum. If necessary, the patient should be relocated to the care ward.
- (3) Consultation opinion of the gastrointestinal surgery: Based on the imaging results, the tumor appears to have no significant connection to the adjacent intestine. Additionally, the patient has an increased amount of ascites, indicating that the presence of a malignant tumor cannot be disregarded.
- (4) Consultation opinion of the urology department: The patient's pelvic mass is huge and may be compressing the ureter. Before surgery, bilateral disposable ureteral stents are recommended to provide guidance and prevent any potential damage to the ureter.
- (5) Consultation opinion of the intensive care unit: The patient, who is elderly, presents with significant pelvic masses. Despite the patient's overall satisfactory condition, there is a possibility for surgical intervention. However, the risk of severe postoperative complications is substantial. Therefore, transferring the patient to the intensive care unit for thorough postoperative monitoring is advisable.
- (6) Consultation opinion of the anesthesiology department: The preoperative examination of the patient revealed normal results for blood gas analysis, liver and kidney function, lung function, and other physiological parameters. However, considering the patient's age and the huge pelvic mass, the possibility of heart failure and organ perfusion disorder after the resection of the mass cannot be ruled out, and various indicators and vital signs of the patient should be closely monitored during the operation.
- (7) Consultation opinion of the bone oncology department: Based on the patient's current imaging scan, the fracture diagnosis is evident. It is recommended to pursue conservative therapy for the fracture and schedule regular follow-up appointments.

- (8) The clinical decision of the superior gynecologist: The nature of the pelvic masses in the patient has yet to be determined, with indications for surgical intervention and no apparent contraindications for surgery. Nevertheless, due to the patient's advanced age and numerous medical comorbidities, there are potential hazards of perioperative cardiovascular and cerebrovascular events, difficulties in extubation, impaired wound healing, and pulmonary infection. It is essential to thoroughly consider the potential dangers associated with surgery and ensure the surgical procedure is conducted at an acceptable juncture.

## **4. MDT group discussion process in the operating room**

### **4.1. Formation of an operating room MDT team**

The MDT consists of the head nurse of the operating room, the head of the gastrointestinal surgery group, the head of the urology group, the head of the obstetrics and gynecology group, the instrument nurses, and the itinerant nurses involved during the surgery.

### **4.2. Preoperative discussion in the operating room**

The MDT in the operating room discussed the patient's condition one day before the procedure. Before the surgery, it was decided that ureteral intubation would be necessary due to the presence of a sizable abdominal tumor in the patient. Therefore, the doctor should prioritize preparing for ureteral intubation. Based on the CT data, the tumor is probably cancerous. Therefore, the instrument nurse should closely monitor the implementation of the surgical isolation technique and oversee the doctors' procedures to prevent the spread and implantation of the tumor. The patient is suffering from multiple pelvic fractures, and it is important to take precautions to prevent further damage to the fracture site during transportation and positioning of the body. The patient exhibits a significant accumulation of ascites within the abdominal cavity. It is crucial to prioritize the maintenance of the patient's circulatory stability during the removal of ascites. It is important to take measures to avoid problems such as ruptured internal carotid aneurysms, deep vein thrombosis, nerve damage, and ocular injury.

## **5. Procedure of surgical coordination**

Following a successful administration of anesthesia, the patient was positioned for cystostomy, and the perineum was disinfected as part of the standard procedure. The nurse assembled a cystoscope kit to aid the doctor in performing bilateral ureteral stents using the cystoscope. Following the implantation of the stent, the nurse aided the doctor in sterilizing the abdominal area and placing towels. The nurse then handed the doctor a 22-gauge round knife to make a vertical incision in the middle of the belly, 10 cm above the paraumbilicus. The electric knife sequentially incised the subcutaneous tissue and anterior sheath of the rectus abdominal layer, gradually exposing the peritoneum. The surgeon cleansed his hands and examined the area, subsequently extracting 4,000 ml of peritoneal fluid from the pelvic cavity. The right ovarian suspension ligament, the right ovarian intrinsic ligament, and the right fallopian tube were severed using moderate bending forceps and an electric knife. The fat round needle was stitched and secured using No. 7 silk thread, and the appropriate accessory was detached. The left ovarian suspension ligament, left ovarian intrinsic ligament, and left fallopian tube were severed using the middle bending forceps and electric knife. The left ovary and fallopian tube were surgically removed. The fat round needle was sewed and tied with the No. 7 silk thread. The surface muscle layer of uterine fibroids was cut using a No. 22 round knife, the fibroids were removed, and the fat round needle was stitched using No. 7 silk thread. The right appendage mass was subjected to frozen section pathology, and a portion of the tumor tissue was sent for assessment. Multi-locular mucinous tumor components and well-

differentiated epithelial cells indicate a mucinous cystadenoma. Once the larger specimens were completely gathered, any lesions of a higher grade were disregarded. An appendectomy was conducted due to the presence of a mucinous tumor and the inability to exclude the appendix as its source. An electric transfer knife was used to remove the mesangium of the appendix. The root of the appendix was held using medium-bent forceps. The appendix was then cut off by tying it with No.7 silk thread. Finally, a 3–0 purse suture with needle and thread was applied. The abdominal cavity was irrigated with 1,000 ml of sterile water for injection and 1,000 ml of normal saline. There was no evidence of ongoing bleeding in the abdominal cavity. The instrument nurse and the itinerant nurse verified the accurate surgical equipment, gauze, and needles before sealing the cavity. The peritoneum was sutured using absorbable suture line No. 1. The anterior sheath of the rectus abdominis was sutured using circular needle No. 7. The subcutaneous tissue was sutured using circular needle No. 1. Finally, the skin was stitched using a skin stitching machine. The surgical nurse aided the surgeon in extracting twin ureteral stents, successfully completing the procedure.

## **6.1. Key points of instrument nurse coordination**

### **6.1.1. Preparation of surgical instruments and accessories**

As was previously mentioned during the consultation, the patient required ureteral intubation before the surgery. Therefore, the instrumentation nurse took the lead at the start of the procedure, they prepared cystoscopic ureteral intubation materials and assisted the surgeon in completing ureteral intubation.

### **6.1.2. Careful attention to isolation techniques**

The preoperative CT scan revealed the presence of multiple metastases in the patient's abdominal cavity, necessitating careful attention to isolation procedures. The tumor will need to be removed by a surgical nurse.

Devices were used and placed separately from other devices. Once the instruments came in contact with the tumor, they cannot be used to excise other areas. The tumor should be removed in one piece as far as possible. The resection of the tumor should be placed in another instrument cart to dissect tissues. The doctor instructed them to change gloves once they touched the tumor.

## **6.2. Key points of itinerant nurse coordination**

### **6.2.1. Posture**

Anesthesia was performed on a transport bed because the patient was in extreme pelvic pain and could not tolerate position changes. Following the administration of anesthetic, it is recommended that a minimum of four people lift the patient simultaneously and transfer them to the operating bed to avoid any additional harm to the fractured area. During the lithotomy position, it is important to reduce the angle between the legs to perform ureteral intubation successfully. Additionally, it is necessary to maximize the angles between the trunk and the thigh and between the thigh and the calf to fulfill the operational criteria. While the procedure is taking place, it is important to instruct the doctor and the assisting nurse to avoid applying pressure to the patient's belly and lower limbs. During the postoperative transfer of the patient from the operating bed to the transfer bed, it is important to ensure that the transporter lifts the patient simultaneously and maintains the lower limb posture of the patient in a stable manner. The patient's status should be conveyed to the supervising nurse.

### **6.2.2. Stress injury and skin protection**

Since the patient has substantial swelling in their lower extremities, their skin is prone to damage. Therefore, inspecting the surgical bed beforehand for a decompression sponge pad and creating a gel pad is necessary. The patient's skin should be examined for pressure ulcers within the room, particularly around the bone process

(specifically the sacral tail). The skin should be inspected once more before exiting the room and ensure a thorough transfer of responsibilities with the ward. When positioning the patient in the lithotomy position, it should be ensured that the leg without pressure is carefully attended to and the bony prominence is adequately protected with padding. To prevent skin injury, it is necessary to wrap the legs with space due to edema in both lower limbs. Before use, it is necessary to encase the three-way arterial puncture tube in a protective covering, ensuring that no compression is applied to the patient's skin throughout the length of each pipeline.

### **6.2.3. Hypothermia prevention**

The patient presents with a substantial surgical incision, multiple exposed organs, a lengthy anticipated operation time, and a significant volume of short-term infusion for ascites discharge. Hence, it is imperative to focus on preventing intraoperative hypothermia in patients. A hydrothermic blanket is positioned beneath the patient to regulate the patient's body temperature. The intraoperative temperature reaches a maximum of 24 degrees. The thermometer should be utilized at the onset of the transfusion/infusion procedure. Ensuring thorough coverage of the patient's intact skin, wet gauze is placed over the abdominal incision region to preserve the patient's body temperature while they await prompt pathological results during the surgical procedure. Shoulder pads are used to insulate the skin in the nonoperative portion of the patient's shoulder.

### **6.2.4. Infusion and blood transfusion**

Due to the extensive surgery with ascites and electrolyte disorders, attention should be paid to the safety of infusion and blood transfusion. To assure the flow rate, puncturing the peripheral venous access using an 18-gauge trocar is recommended. Before the operation of hand wrapping, the itinerant nurse ensured that the skin around the puncture site was not exhibiting any signs of redness or swelling, the infusion access was inconspicuous, and the pipeline was not being compressed. To prevent a sudden drop in blood pressure induced by the rapid removal of ascites from the abdominal cavity, it is advisable to have vasoactive medications prepared in advance due to the high volume of ascites in the patient. The nurse should promptly communicate with the anesthesiologist when the doctor absorbs ascites, closely monitor the patient's vital signs, expedite the infusion as needed, and aid in administering vasoactive medications. Itinerant nurses must carefully monitor the amount of fluid in the abdominal cavity and promptly replace and measure it when there is an excessive amount in the suction sac. They should preemptively prepare electrolyte injections, such as calcium chloride and potassium chloride, and promptly provide them when needed. They should also observe the fluctuations in the patient's urine output before administering potassium supplements, consult with the anesthesiologist regarding medication interactions, and carefully consider how potassium chloride is administered. Continuous communication is maintained with the anesthesiologist to preserve the patient's kidney function by keeping the urinary duct access intact. Before the transfusion, the itinerant nurse diligently consulted with the anesthesiologist to prevent errors. Furthermore, the nurse administered methylprednisolone beforehand as per the doctor's recommendation and observed the changes in skin condition and vital signs during the transfusion process, remaining vigilant for any subsequent responses following the transfusion.

### **6.2.5. Prevention of postoperative complications (ruptured internal carotid aneurysm, deep vein thrombosis, nerve injury, and corneal injury)**

The patient came with hypertension, the development of arteriosclerosis plaques in both lower limbs, and an internal carotid aneurysm. It is important to focus on preventing postoperative problems. The patient assumed the lithotomy position and the itinerant nurse secured the position frame. Throughout the procedure, careful observation was made regarding any alterations in the patient's leg angle and the maintenance of a level

treatment towel within the leg cover. To prevent interference with venous return, it is important to ensure that the leg restraints on the patient are not excessively tight. During surgery, the distance between the patient's legs is maintained, minimizing nerve damage risk. When utilizing the shoulder brace, be cautious to prevent extended compression of the shoulder skin while the head is in a low position and the feet are elevated. It is necessary to monitor the condition of the shoulder skin at two-hour intervals. If the patient adopts a position with the head lowered and the feet elevated, it is advisable to limit the duration of this position. It is important to communicate with the surgeon every hour to promptly reposition and alleviate pressure on the carotid artery produced by gravitational forces. During the procedure, the doctor assisted in maintaining the patient's stable blood pressure. During the procedure, the doctor extracted peritoneal fluid and removed the tumor, which required the maintenance of unimpeded venous access and continuous fluid infusion. Following the anesthetic administration, the itinerant nurse affixed clear tape to the patient's eyes to safeguard the cornea. During the operation of the anterior edge of the head frame, it is important to focus on exposing the patient's eyes and performing tracheal intubation. This is done to prevent any pressure on the eyes or catheterization during the surgery.

## **7. Results**

The patient's large abdominal mass was successfully removed, resulting in a blood loss of 100 ml. The patient's vital signs remained stable throughout the operation, and there were no postoperative complications such as deep vein thrombosis or secondary fracture. Both the operating room nurses and anesthesiologists expressed 100% satisfaction.

## **8. Discussion**

### **8.1. Operating room nurses participate in surgical MDT rounds to provide individualized nursing care for surgical patients**

Surgical coordination is the central focus of the operating room. Most operating room nurses in domestic hospitals currently utilize the standard coordination strategy with the disease as the focal point. Nevertheless, in the case of intricate medical records, including numerous problems, nurses must comprehend the patient's condition and surgical techniques to collaborate with surgeons seamlessly <sup>[8-10]</sup>. The nurses' involvement in MDT rounds enhanced their understanding of the patient's overall condition, enabling them to devise appropriate nursing interventions and grasp the essential aspects of care. This targeted collaboration significantly improved the patient's surgical safety and the quality of surgical cooperation.

### **8.2. Participation of operating room nurses in surgical MDT rounds provides a platform for nurses to re-learn**

MDT rounds are a procedural discussion among doctors to determine the optimal treatment plan for patients undergoing intricate surgical procedures. Operating room nurses participating in a surgical MDT round allow nurses to gain insight into doctors' surgical plans and proactively prepare necessary things through effective communication. Consequently, this reduces patients' intraoperative waiting time and saves surgical procedure costs. Furthermore, it facilitates medical communication and enhances the understanding of the concept of collaboration among operating room nurses. MDT directs the medical personnel to shift the surgical approach from focusing on the disease to prioritizing the patient, as patients vary in their illnesses and physical states, particularly those with comorbidities. Hence, it is imperative to ensure that patients' surgical coordination is

tailored to their unique needs and that nursing interventions are implemented accordingly to enhance the overall quality of surgical cooperation. Furthermore, the discussion process of the MDT round enhances the expertise of operating room nurses<sup>[1]</sup>, encouraging them to adopt a more holistic approach when dealing with surgical patients.

### **8.3. Operating room nurses establish the MDT team to give full play to the strengths of each specialty group**

As surgical specialization has advanced, treating diseases within specific fields has become increasingly precise. Consequently, operating room nurses have progressively pursued specialized training to enhance their technical proficiency. Nevertheless, as the perspective on medical care shifts towards a holistic approach, the MDT combines the perspectives of patients with diverse medical conditions and their expertise to optimize the match between each specialty's strengths and the unique characteristics of individual patients. Hence, specialist teams in the operating room must engage in professional consultations with various patients based on their respective areas of expertise to ensure that patients receive a more thorough and optimal level of treatment. Simultaneously, engaging in discussions with various patients enhanced the operating room nurses' capacity to analyze and solve problems.

### **8.4. MDT established by the operating room nurses promotes communication among the various specialty groups**

Each specialty group in the operating room is relatively independent due to each department's distinct surgical cooperation specialties. Specialist doctors who exclusively cooperate inside their specialty group can often encounter issues such as limited perspectives and team isolation. The foundation of the MDT group has facilitated communication among the leaders of different specialty groups, fostering mutual affinity and promoting a deeper understanding of related fields.

## **9. Conclusion**

In this study, we presented that involving operating room nurses in ward rounds is a valuable opportunity to gain a comprehensive understanding of patients and enhance their knowledge. This facilitates the shift from a focus on diseases to a patient-centered approach in nursing. Meanwhile, the MDT in the operating room engages in preoperative conversations to formulate personalized surgical collaboration plans for patients, thereby enhancing the quality of surgical collaboration among operating room nurses.

## **Disclosure statement**

The authors declare no conflict of interest.

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