Nursing for HIFU Treatment of Uterine Fibroids or Adenomyosis

In this lecture we are going to learn the nursing care for HIFU ablation of uterine fibroids and adenyomyosis.

The perioperative nursing involves five parts: 1. pre-operative preparation, 2. intra-operative nursing care, 3. post-operative nursing care, 4. post-discharge guidance, and 5. common post-operative responses and corresponding management.

I. Pre-operative preparation

Pre-operative preparation involves patient education and preparation of bowels, bladder and skin, as well as preparation of operation materials.

Bowel preparation involving fasting, laxation and enema is intended to remove the food residues and faeces in the intestines and to reduce the bowel gas thus to avoid or reduce the risk of HIFU-induced bowel injury. Before treatment, the patient is required to take food that is easy to digest and produces no residues. Dietary preparation or fasting starts based on the patient's bowel movement habit. If the patient defecates once a day or every two days, fasting starts on one to two days before HIFU treatment; if the patient suffers from constipation, fasting should start earlier.

Dietary preparation: 3 days before treatment, the patient is required to take soft food such as rice, noodles, appropriate amount of meat, a few of vegetables, melons and fruits. As melons contain less crude fibers, the patient can take a small quantity of them. Leafy and root vegetables that are rich in fibers can be made into juice without residues. 2 days before treatment, the patient is required to take semi-fluid food such as porridge or the soup without oil or residues. 1 day before treatment, the patient is required to take fluid food that does not produce residues or gas, such as egg soup, porridge, or the soup without residues. On the day of treatment, the patient does not take any food. It should be emphasized that glucose should be prepared ready in case that the patient suffers from hypoglycemia in the course of dietary preparation. The food taken by the patient can be

boiled or steamed but not fried or greasy. High-protein food such as milk or soybean milk tends to produce gas and therefore should be avoided; in addition, high-fiber food such as wheat flour or corn should not be taken.

According to the Chinese public medical insurance policy, the patient who undergoes HIFU treatment of uterine fibroids or adenomyosis will be admitted to hospital 1 or 2 days before treatment. The patient is instructed to keep her stomach empty in order to undergo laxation in the morning of the day when she is admitted to the hospital. The patient takes 1,000 to 1,500 ml of warm water with laxatives such as Polyethylene Glycol Electrolytes Powder or Sodium Phosphates Oral Solution usually at 4:00 p.m. to 6:00 p.m. of the day before treatment. It should be emphasized that the patient should finish the water with laxatives within 1 to 2 hours, otherwise the laxative effect may be compromised. Taking the laxatives at 4:00 p.m. to 6:00 p.m. is aimed at making the patient finish defaecation before bedtime so as not to disturb her night rest before the treatment.

Enema is performed on the morning of the treatment day. Glycerinum is used, because it is easy to handle. Enema is performed once until the bowel excretion becomes clear liquid. If the bowel excretion does not meet the requirement, then enema using warm saline will be performed until the bowel excretion is as clear as the saline. The upper two images are unsatisfactory bowel preparation. In the first image, the patient needs to take more laxatives, while in the second image, the patient needs to continue enema. In the third image, the bowel excretion is adequate without residues though its color is dark yellow. The fourth image shows the most desirable enema result.

Bladder preparation

Before learning bladder preparation, we are going to learn the anatomical structure of pelvis. Here is the bladder before the uterus. The uterus is surrounded by intestines including the rectum, the sigmoid colon, the transverse colon, and the descending colon, etc. As the full length of intestines is about 12 to 15 centimeters, the rectum, the sigmoid colon, the descending colon and the transverse colon cannot be cleaned by enema. Therefore, it is critical for the patient to undergo fasting and laxation.

Before the uterus, there is the bladder. During treatment, the bladder is filled with water. The patient lies in a prone position on the treatment bed with the therapeutic transducer below the abdomen generating the ultrasound beams that penetrate the abdomen and the bladder. Filling the bladder with water plays a major role in the HIFU ablation of uterine fibroids or adenomyosis: on the one hand, water serves as the medium through which ultrasound travels to the uterus; on the other hand, the filled bladder pushes the intestines away from the acoustic pathway so that a safe acoustic pathway can be established.

In the cases of some fibroids at special locations, the patient is instructed to train her bladder for 1 to 2 weeks from HIFU treatment, if her bladder is not big enough. For instance, if a patient has a fibroid at the anterior uterine wall, the bladder filled with 200 to 300 ml of water is sufficient; however, if the fibroid is located at the posterior or side wall of uterus, the bladder may need to be filled with 500 ml of water, which may be unbearable for the patient. The bladder training exercise is to drink water and hold urine to improve the tension of bladder and the patient's tolerance for holding urine. Bladder training should go step by step. For instance, the patient can practice holding urine for 5 minutes at first, then gradually prolonging the time to 10 and 15 minutes. However, the patient with a large fibroid should not hold urine for a long time at the beginning of bladder training, otherwise she may suffer from urine retention after HIFU ablation. Some patients may need to practice lying in a prone position if they cannot maintain this posture for a long time, because HIFU ablation of uterine fibroids or adenomyosis requires the patient to be in a prone position for 1.5 to 2 hours.

Pre-operative skin preparation

The principle of skin preparation for HIFU ablation is similar to that for surgery. Shaving and cleaning the skin of interest will be performed on the day before or the day of treatment. Skin preparation should cover the area from the umbilicus to the two midaxillary lines and to the perineum and crotch. Degreasing and degassing of the skin of interest is performed on the day of treatment, the details of which will be elaborated later.

Patient health education

The chief nurse or the operating room nurse shall communicate with the patient before treatment to inform the patient of the dos and don'ts, share the HIFU treatment experience to relieve the patient's stress and comfort the patient psychologically. The patient shall lie in a prone position on the treatment bed, sleep and keep her body still during treatment. The patient shall know she will undergo urinary catheterization and most of all understand what is normal and abnormal experience during procedure and know to timely report to the doctor any abnormal sensations during the treatment.

At the left side are the normal snesations the patient may encounter during treatment, such as a distending pain in the treatment region of lower abdomen as intense as menstrual cramps, a distending pain in the sacrococcygeal region, a straining feeling in the anus, soreness around the waist, and an urge to urinate or defaecate. If the patient can tolerate these feelings, the treatment continues; if not, the patient shall inform the medical staff. At the right side are the abnormal sensations the patient may experience during the treatment, including a burning sensation over the lower abdomen, which may vary in intensity, from a mild pricking sensation to a feeling of being scalded, and discomfort such as soreness, numbness, distension, pain, and warmth in the groin, area from the gluteal folds down to the feet, and legs. The patient needs to know that as soon as such sensation occurs, she needs to inform the medical stuff immediately without trying to put up with it, whether it is mild or strong, so that the doctor then can adjust the treatment plan accordingly or even stop the treatment. In addition, the nurse shall also inform the patient of the specific sites of body parts, such as groin and gluteal folds. If it is necessary, the nurse can ask the patient to recite the normal and abnormal sensations. Patient education should take place in a way that is acceptable by the patients but not stressful.

Preparation of materials

Crash cart, oropharyngeal airways, manual ventilator, and ECG monitor should be prepared ready. Medicines used before and during treatment include Testosterone Propionate Injection for reducing the blood supply of fibroid, granisetron injection for anti-vomiting, oxytocin injection for uterine contraction, and sulfur hexafluoride (contrast agent) for evaluating the blood supply of tumor before, during and after treatment. Auxiliary medicines include sodium chloride and calcium gluconate for resitting

respiratory alkalosis, tramadol dydrochloride injection for analgesia, flumazenil injection and naloxone hydrochloride injection for resisting the effect of midazolam and fentanyl respectively, nitroglycerine for vasodilation, urapidil for reducing blood pressure, Hydroxyethyl Starch 130/0.4 and Sodium Chloride Injection for improving anemia or oligemia, and electrolyte for preventing the fasting-induced electrolyte imbalance.

II. Nursing care procedure on the day of treatment

The nursing care on the day of treatment involves generally eight parts, i.e., 1. to establish sufficient venous access, 2. to insert a urinary catheter, 3. to degrease and degas the skin of interest, 4. to position the patient properly, 5. to fill the bladder with water, 6. to cooperate with the doctor and monitor the patient's responses during treatment, 7. to perform nursing care immediately after treatment, and 8. to disinfect comprehensively the devices used.

First, to establish sufficient venous access. Insert an indwelling needle into a thick vein and keep the venous access unobstructed. Next is to insert a urinary catheter into the bladder in a conventional way. To get rid of the air in the balloon and fix the catheter, first pump out the air in the balloon and then inject 10 to 15 ml of saline into the balloon. It should be emphasized that no air is allowed in the balloon in order to prevent the reflection of ultrasound by the air bubbles trapped in the bladder.

The third step is degreasing and degassing of the skin of interest. Wipe the skin of interest with 75% ethanol to eliminate the grease on the skin, and then wipe the skin with degassed water and degas the skin with the suction device. The skin of interest covers the treatment region and extra 8 cm surrounding the treatment region. Look at the picture, this is the handle connected to the vacuum suction device, and this is the suction head.

Attach the suction head close against the skin to degas the skin while wiping the skin with degassed water. To avoid injury to the skin, do not place the suction head at one site for a long time and do not press the suction head against the skin too hard. Generally speaking, at each site of the skin, the suction head rests for 6 to 8 seconds until a vague circle mark appears on the skin. Every two adjacent degassing sites should have 2/3 part overlapped to leave no space undegassed. If treatment does not start more than 2 hours after degassing, degassing procedure should be repeated before starting the treatment.

Water sealing

Please pay special attention to the water sealing at umbilicus, especially for the patients with large fibroids or whose uterus is located as high as the umbilicus or higher than the umbilicus. Lay the patient flat on her back on the treatment bed, then drip two drops of degassed water on the umbilicus, wipe the skin surrounding the umbilicus clean, and seal the umbilicus with a sticky film, next turn the patient's body and make the patient lie in a prone position with her abdomen submersed in degassed water, and then take off the sticky film.

Positioning of the patient's body

During HIFU ablation, the patient lies in a prone position to meet the treatment needs as much as possible meanwhile keeping herself comfortable and safe and protecting from injury to the blood vessels, nerves or soft tissues caused by compression. Special note: protect the patient's breasts with a breast pad, because women are likely to feel uncomfortable at her breasts when lying in a prone position for a long period of time. In addition, do not over tighten the water-sealing belt, otherwise it may cause discomfort at the lower limbs or even impede the blood circulation of the lower limbs.

Fix the IV tubes, the oxygen tubes, the urinary catheter and the ECG monitor well. In the right side picture, a tissue is placed in between the oxygen tubes and the patient's face to protect the patient's facial skin and make the patient more comfortable.

Pre-operative preparation of treatment bed

On the treatment bed, there are a head pad, a foot pad, disposable covers for body-positioning pads, water sealing membrane, and a breast pad. In the middle of the treatment bed is the water reservoir. Below the water sealing membrane is the vacuum air-cushion. When the patient is positioned well, pump out the air in the vacuum air-cushion to fix water sealing. Leave a space in between the vacuum air-cushion and the water-sealing membrane, which allows a hand to get through to touch the skin of treatment region and place and take the ultrasound coupling balloon.

Bladder filling

After inserting the urinary catheter, inject the saline of 37℃ into the bladder and prevent the air from entering the bladder. That the saline temperature is close to the body temperature is intended to reduce the generation of bubbles in the bladder. During treatment, as the patient is receiving fluid infusion and thus generates urine, to avoid over-extension of the bladder, the nurse shall discharge 50 ml of urine every hour and observe the color of urine. Before discharging the urine, the nurse should inform and consult the doctor.

Intra-operative observation and cooperation

1. Keep the venous access unobstructed, observe the patient's response to medicines, and place an ultrasound coupling balloon according to the treatment requirements. The ultrasound coupling balloon is shown in the picture at the right side of this slide. The balloon containing degassed water is placed in between the patient's abdomen and the therapeutic transducer to help to build a sufficient acoustic pathway for treatment.

2. Observe the level of sedation and analgesia and the patient's reaction to treatment. If the patient suffers radiating pain, report it immediately to the doctor. At the same time pay attention to the patient's mental state and comfort the patient or relieve the patient's stress by playing some light music. If the patient has any reaction, identify whether it is normal or abnormal and the cause of the patient's reaction. For example, identify whether the patient's reaction is related to the pace of treatment or the body position. If the patient still feels discomfort in the lower limbs when treatment is suspended, the discomfort may be caused by the over-tighten water-sealing belt. In this case, loose the water-sealing belt appropriately and observe whether the patient feels better.

3.Pay attention to the electrocardiogram and the patient's vital signs and keep records. When the patient suffers an intense pain, her heart rate, blood pressure and respiratory rate rise accordingly. Therefore, the vital signs can be used as a reference for evaluating the degree of pain approximately in case that the patient's tolerance for pain is poor.

4. Observe the skin of treatment region and the patient's reaction in the rear ultrasonic field and take some measures to cool down the patient's skin when necessary. According to the doctor's instruction, touch and feel the treatment region when treatment

pauses to check whether there are any scratches or blisters on the skin, or observe the skin by using a mirror. For the patient with a fibroid close to the sacrum and coccyx, it is necessary to pay attention to the patient's reaction in the rear ultrasonic field. If the patient feels warmth, being scalded or even pain in the sacrococcygeal region, take the blanket off from the patient's back to dissipate heat, then spray cool water on or rinse the sacrococcygeal region to cool it down. Spraying cool water is preferred, because it makes the patient more comfortable. Do not apply a cold or wet compress on the skin, as it is not favorable for heat dissipation.

5. Inspect the nursing care procedure and make records in time, cooperate with the doctor and observe the treatment process.

Nursing care immediately after treatment

1. First step of post-operative care is to empty the bladder and then fill the bladder with 200 to 300 ml of saline of 4 to 10 ℃ and keep the saline in the bladder for 10 to 15 minutes. Repeat this operation for 2 to 3 times to cool down the bladder and the uterus gradually.

2. For the fibroid at the posterior uterine wall, the patient should lie in the prone position for 1 to 2 hours after treatment to prevent the ablated fibroid from irritating the nerves in the sacrococcygeal region, while for the large fibroid at the anterior uterine wall, the patient needs to lie on her back after treatment. If the operating room is available, submerse the patient's abdomen in the degassed water for 10 to 20 minutes after treatment to cool down the skin; if not, apply a cold or ice compress on the abdomen.

Disinfection

After treatment, the nurse shall clean and disinfect the water reservoir and the treatment bed. Wipe the water reservoir and the treatment bed with chloric sanitizer or 75% ethanol. Sanitize the operating room with ultraviolet light at night.

III. Post-treatment nursing care

1. Monitor the patient's vital signs and provide the patient with oxygen inhalation.

2.Instruct the patient to lie in a prone position for 1 to 2 hours, but the patient with a large fibroid at the anterior uterine wall shall lie in a supine position.

3.Check the skin of treatment region to see whether the skin overheats or any blisters on the skin. If the skin overheats, apply an ice compress on the affected skin intermittently with the ice wrapped in the towel to prevent frostbite of skin. If there is any blister or scratch on the skin, handle it according to the principle of surgical management. Disinfect the scratch and dress it with sterile gauze. Drain the blisters and disinfect the affected skin and then dress it with sterile gauze.

4. Observe the signs of abdominal reaction. It is common and normal that the patient may feel some discomfort and a mild distending pain in the abdomen after treatment. What should be cautious about is abdominal irritation.

5. Check whether neuronal irritation occurs in the lower limbs and whether the motion function of the lower limbs is abnormal. In most cases, the lower limbs are normal.

6. Observe if there is any vaginal discharge. A few of patients with the fibroid located close to the uterine cavity or endometrium may have a small amount of vaginal discharge after treatment, which is normal.

2 hours after treatment, if the patient does not vomit or feel nausea, she can drink some water and then take some fluid diet such as glucose water or soup.

Keep the urinary catheter in the bladder for 2 to 3 hours after treatment and then take it out and make the patient urinate by herself. Observe the color and property of the urine. Instruct the patient to drink plenty of water and frequently to prevent constipation when the patient resumes normal diet.

IV. Post-discharge guidance

On the second day after treatment, the patient shall take a little of semi-fluid diet and some soft food and eat small meals. On the third day after treatment, the patient can return to normal meals gradually if she does not have obvious discomfort in her stomach.

The patient shall not lift heavy things or take a bath or hot spring until vaginal discharge disappears (if any); shower is allowed. The patient can have sexual intercourse with certain contraception measures after one menstrual period. The patient is advised to plan pregnancy according to the re-examination result at 3 months after treatment.

The patient shall not do strenuous exercise such as plank or sit-up within a month after treatment.

The patient is advised to drink plenty of water and frequently when she resumes normal meals and take more fiber-rich vegetables and fruits to help with defaecation.

The patient is instructed to take antibiotics on time to prevent secondary infection and to contact the doctor when she feels an abnormal intense pain in the lower abdomen or has a large amount of vaginal bleeding.

The patient is instructed to receive re-examinations regularly at 1 month, 3 months, 6 months, 12 months and 24 months after treatment.

V. Common post-operative responses

The patient needs to know the common post-operative responses.

1. Discomfort of the skin. The patient may have an impression or redness of skin resulted from the compression by therapeutic transducer, which may disappear 1 to 2 days after HIFU in most cases. Scratches on the skin may take as long as several days or a week to disappear. Blisters need appropriate management.

2. The patient may experience a mild distending pain in the lower abdomen, waist or buttock, which is associated with the posture applied during HIFU ablation and may disappear several days after HIFU when the patient resumes conventional posture.

3. The patient may feel dizzy, vomiting or nausea which is induced by the analgesics and sedatives and may disappear when the drugs are completely metabolized.

4. The patient may experience symptoms of urinary tract irritation such as urgent urination, painful urination or frequent urination, which is associated with irritation of urinary tract mucosa caused by the urinary catheter. In this case, light diet and drinking

more water can help to improve the symptoms, and taking antibiotics can help to reduce local inflammation.

5. The patient may have a temporary menstrual cycle change within 1 to 3 months as a result of stress reaction to HIFU therapy or because the lesion is located close to the uterine cavity. In this case, the patient is given medications and advised to observe her menstrual period for 1 to 3 months.