Diagnosing Ovarian Cancer through Computed Tomography

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Introduction

- Ovarian cancer (OC) is an aggressive gynecological disease in which cells divide rapidly within the ovaries.
- Computed tomography (CT) is the modality of choice for visualization of ovarian masses and metastases.
- A computed tomography scan provides cross-sectional evaluation of the genitourinary system and the surrounding tissue.

Ovarian Cancer

- Is the fifth leading cause of cancer in women with a current 5-year survival rate of 49.1% (El Homsi et al., 2022)
- Is classified by the origin tissue type:
  - Epithelial ovarian carcinoma is the most common type
  - Makes up 85-90% of ovarian cancers
  - Originate from the outer surface cells of the ovary

(American Cancer Society [ACS], 2024)

Diagnostic Procedures

- **Ultrasound** detects ovarian masses
  - Determines if fluid-filled cysts or solid tumors
- **Computed tomography** scans in cross sectional slices
  - Assess for metastasis
  - Evaluate lymph nodes for enlargement
  - Used to find and stage tumors

Abdominal Pelvic CT protocol:

- Scans from lung bases through symphysis pubis
- AP and Lateral scout images
- May use intravenous iodinated contrast media
- Sagittal and coronal reconstruction planes

(Palazzolo, 2023)

- **Biopsy** determines if masses are cancerous
  - Tissue or fluid is removed and tested in the lab

Symptoms

Signs and symptoms can be dependent upon the stage of cancer. Most symptoms vary from person to person. Commonly patients present with gastrointestinal tract symptoms. Symptoms tend to be frequent and severe.

- Abdominal pain is most common
- Loss of appetite
- Bloating
- Fatigue

(ACS, 2024)

Staging

The International Federation of Gynecology and Obstetrics (FIGO) utilizes the TNM scoring system to determine the stage of cancer.

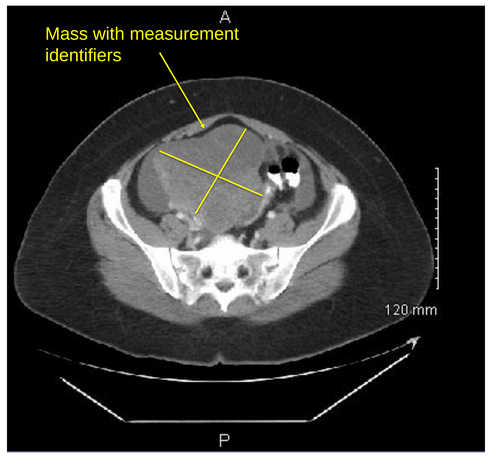
- **T**umor- size of the tumor
- **N**odes- spreading of cancer to lymph nodes
- **M**etastasis- cancer spreads to surrounding tissues or organs

“Advanced stage disease is defined as FIGO Stage IIb-IV, which means that cancer has spread on or into the adjacent pelvic peritoneal tissues, extended to the upper abdomen or outside the abdominal cavity” (Engbersen et al., 2021, p. 2, para. 1).

FIGO stage	(TMN)	description
I		Tumor confined to the ovaries or fallopian tubes.
- A	T1a N0 M0	A: unilateral
- B	T1b N0 M0	B: bilateral
- C	T1c N0 M0	C: in one or both ovaries or fallopian tubes with (1) intraoperative surgical spill, (2) a ruptured capsule, or (3) malignant cells in the peritoneal washing or ascites
II		Primary peritoneal cancer or tumor in one or both ovaries or fallopian tubes with
- A	T2a N0 M0	A: Extension and/or implants on the uterus and/or fallopian tubes/ ovaries
- B	T2b N0 M0	B: Extension to other pelvic intraperitoneal tissues
III		Primary peritoneal cancer or tumor in one or both ovaries or fallopian tubes with
- A	T3a NX M0	A: (1) tumor positive retroperitoneal lymph nodes, (i
) up to 10 mm in largest diameter or (ii) larger and/or (2) microscopic PM above the pelvic brim		
- B	T3b NX M0	B: macroscopic PM beyond the pelvis up to 2 cm in largest diameter
- C	T3c NX M0	C: macroscopic PM beyond the pelvis more than 2 cm in largest diameter
IV		Distant metastases excluding PM
- A	TX NX M1	A: tumor positive pleural effusion
- B	TX NX M1	B: Parenchymal metastases and metastases to extra abdominal organs (including inguinal lymph nodes and lymph nodes outside of the abdominal cavity)

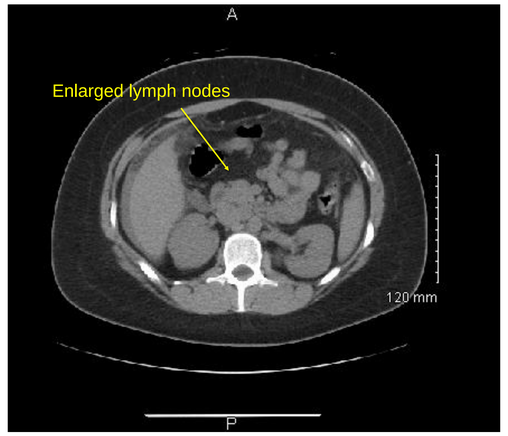
This table shows the TMN scoring system associated with the FIGO stage and a brief description of the cancer per stage (Engbersen et al., 2021, p. 2).

Clinical Images



(Clinical Affiliate Site, 2023a)

Figure 1: A 10 x 10.4 x 11.5 cm heterogeneous mass arising from right ovary viewed on an abdomen/pelvis CT (Clinical Affiliate Site, 2023b)



(Clinical Affiliate Site, 2023a)

Figure 2: Enlarged periaortic lymph nodes viewed on an abdomen/pelvis CT (Clinical Affiliate Site, 2023b)

Pathology

- Primary tumor has irregular walls and internal septations
- Metastases occurs within the lymphatic system affecting lymph nodes
- Ascites can indicate peritoneal spread of cancer

(Webb et al., 2020)

Treatment

- Surgery
- Hormone therapy
- Radiation therapy
- Targeted therapy
- Immunotherapy

All treatment options will be decided upon by doctor and patients. Often patient treatment plans involve combinations of therapy. Ovarian cancer is primarily treated by surgery. Surgery is performed to stage and debulk.

- Exploratory operation to determine the extent of the disease
- Debulking involves removing as much cancer as possible
  - Hysterectomy-removal of uterus
  - Bilateral salpingo-oophorectomy-removal of uterus, fallopian tubes, and both ovaries

Chemotherapy is the use of drugs in the bloodstream to treat cancer. Advanced ovarian cancer utilizes a combination of platinum and taxane-based drugs to reduce and kill cancer cells.

(ACS, 2024; Engbersen et al., 2021)

Post Treatment

Follow-up treatment plans are determined between doctor and patient. Follow-up plans change throughout years after therapy. Post-therapy CT scans should be performed every three months after treatment within the first year, along with routine blood tests for tumor markers and hormone levels.

Computed tomography scans assess for suspicious masses after treatment. As time goes by, duration between scans can be prolonged post-therapy progress (Pressey et al., 2020).

Conclusion

- Ovarian, a common, aggressive form of cancer often undetected in early stages, affects a large portion of the female population.
- Computed tomography proves to be helpful in diagnosing and staging of ovarian cancer
- Post-treatment computed tomography is useful in documenting residual tumor and recurrence of ovarian cancer

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