

Antonio Jesús Muñoz Serrano

Radiology and Physical Medicine

**NEOADJUVANT,
ADJUVANT,
INTRAOPERATIVE
AND EXCLUSIVE
RADIOTHERAPY**

RADIOTHERAPY IN CANCER TREATMENT

Nowadays, Radiotherapy (RT) is an useful therapeutic tool in Oncology, due to the fact that it is the most important non-surgical treatment of cancer (the 50% of oncology patients will be treated with RT in some moment of their illness)¹.

Depending on the side that RT have in oncology treatment with surgery-RT, we can differentiate three methods¹:

- 1. Noeoadjuvant RT**
- 2. Adjuvant RT**
- 3. Intraoperative RT**

Besides, RT could be also used as an exclusive way of treatment.

NEOADJUVANT RADIOTHERAPY

Neoadjuvant RT function:

- 1.To remove subclinical disease out of surgical margins.
- 2.To decrease the implementation of cancer's cells during the surgery.
- 3.To eradicate node's metastasis that are outside of surgery.
- 4.To decrease cancer's ability to occasionate metastasis.
- 5.To decrease tumor size, thus increasing its resectability .¹

NEOADJUVANT RADIOTHERAPY

Applications:

Neoadjuvant Radiotherapy can be used in different kind of tumors, including rectal cancer.

Besides neoadjuvant chemotherapy, neoadjuvant RT is indicated in the following situations:

- **Definitive indication** → Rectal cancer T3/4
- **Others relative indications** would be:
 - Clinically node-positive in rectal cancer T1/2
 - Tumor which invade mesorectal fascia on operative imaging¹

ADJUVANT RADIOTHERAPY

Adjuvant RT function:

1. To remove subclinical residual disease after surgical treatment.
2. It allows to administer high radiation doses at risky areas, decreasing local recurrences ¹.

Disadvantages:

1. Surgery delays RT application.
2. Surgery produces hypoxemia in surgical area, decreasing RT efficacy ¹.

ADJUVANT RADIOOTHERAPY

Applications:

Adjuvant Radiotherapy can be use in a sort of tumors, as for example breast cancer.

Nowadays, its indications includes:

- Patients treated with breast conserving surgery
- Patients who suffer from breast cancer T4, T3 with positive surgical margins or any size which have 4 or more positives nodes treated with mastectomy.
- Patients treated with neoadjuvant chemotherapy who are defined as a locally advanced breast cancer before surgery¹.

INTRAOPERATIVE RADIOTHERAPY

Concept:

Administration of radiation during surgery. It allows to apply high RT doses on the area of interest, with minimum harm over adjacent tissues since it can be protected or moved from the area of radiation².

Indicación:

Intraoperative radiotherapy is indicated in patients who meet the following conditions:

1. Patients who are going to undergo surgery.
2. Risk of local recurrence is high.
3. There are dose-limiting tissues in the area of radiation¹.

INTRAOPERATIVE RADIOTHERAPY

Advantages:

- ✓ To decrease the area of radiation.
- ✓ To allow moving dose-limiting tissues.
- ✓ To increase the total effective dose.
- ✓ To decrease the time between surgery and RT. It decreases the probability for a tumor repopulation².

Disadvantages:

- ✗ To increase late toxicity, being fibrosis able to appear in slow response tissues².

INTRAOPERATIVE RADIOTHERAPY

Modalities:

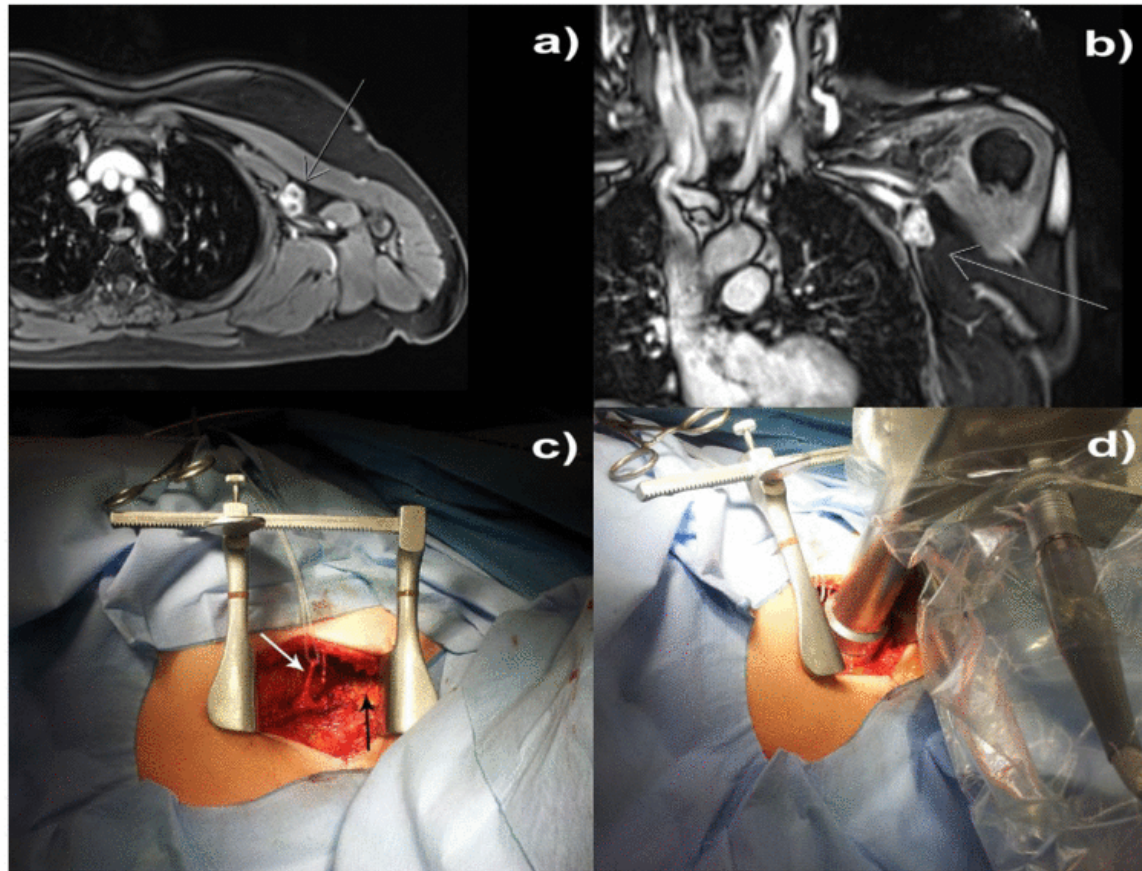
There are two sort of Intraoperative Radiotherapy:

- Intraoperative Radiotherapy with electrons
- High dose rate brachytherapy .¹

Current Results of Intraoperative Radiotherapy:

Nowadays, it is under study.

Results show an improvement of the Surgery-RT combination as an oncological treatment, since surgery allows to apply a more precise regimen of RT with the fewest damage over normal tissues².



Axial (a) and coronal (b) Magnetic resonance images of an axillary mass. Surgery of the lesion (c). Intraoperative radiotherapy (d)

Schneider F, Clausen S, Rhölking J, Wenz F, Abo-Madyan Y. A novel approach for superficial intraoperative radiotherapy (IORT) using a 50 kV X-ray source: a technical and case report. *Journal of Applied Clinical Medical Physics* 2014; 15 (1)

EXCLUSIVE RADIOTHERAPY

The objective of Exclusive Radiotherapy is to replace the tumor surgery completely⁴.

Indications:

The principal indications of this sort of radiotherapy are:

1. Curative intention in radiosensitive tumors without high risk of distant metastasis.
 - Example: Hodgkin's disease E-IC and II.
2. Palliative intention, when there are no other available therapies or they are contraindicated³.



BIBLIOGRAPHY

1. *González Barón M, Espinosa E, Feliu J, De Castro J, Casado E, Zamora P et al. Oncología clínica. 3ª Edición. Madrid : Momento Médico Iberoamericana; 2010*
2. *Calvo FA, Biete A, Pedraza V, Giralt J, De las Heras M. Oncología radioterápica. Principios, métodos, gestión y práctica clínica. Madrid: Arán; 2010.*
3. *Herrera Gómez A, Granados García M. Manual de Oncología. Procedimientos médico-quirúrgicos. 5ª Edición. México: McGraw-Hill ; 2013.*
4. *Casciato DA, Territo MC. Manual de Oncología Clínica. 7ª Edición. Barcelona: Wolters Kluwer Health, Lippincott Williams & Wilkins;2012.*