New and Emerging Therapies: Non-Melanoma Skin Cancers

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Superficial Radiation Therapy (SRT)

Electromagnetic Spectrum
Modern SRT Equipment

- Utilizes low energy photon X-rays operating at variable peak voltages of 50, 70, and 100 kVp.
Modern SRT Equipment

- Planned calibrated dose delivery is accurate with internal filtration technology.
Modern SRT Equipment

- Unit automatically stops when cumulative amount of radiation is delivered.
Modern SRT Equipment

• Easy to administer

• Effectively targets and treats lesions

• Delivers gentle indirect radiation which does not penetrate and impact the underlying healthy tissue.
Evidence Based Therapy

• The cure rate for 1715 primary nonaggressive NMSC treated with the SRT-100™ was 98% (Cognetta et al, JAAD 2012).
Tumor and Patient Selection: Treatment Objectives

- To eradicate the tumor while maintaining or improving the patient’s quality of life.
Tumor and Patient Selection: Treatment Objectives

- To deliver a measured dose of radiation to a defined volume with minimal damage to surrounding normal tissue, resulting in eradication of the tumor.
Tumor and Patient Selection: Treatment Objectives

• Prolongation of lifespan
Evaluation of Patient

• History

• Clinical examination

• Histopathology
Clinical Examination

• Anatomical location, surrounding tissue and adjacent structures
• # of tumors
• Proper illumination is the gold standard of margin delineation
• Ill-defined lesion, scouting biopsies may be warranted
• Palpation – depth, mobility
• R/O lymphadenopathy
• R/O metastasis
Histopathology

- Histologic subtype of NMSCs must be determined prior to selecting tumors for SRT

- Certain subtypes confer a higher risk of recurrence, aggression and metastasis.
Histopathology

• Helps to define tumor margins along with clinical examination of lesion.

• Guides energy selection which is based on the deepest portion of the lesion.
Histopathology

CAVEAT!

High risk lesions need higher energy for penetration due to the fact biopsy reports can yield insufficient depth data.
Tumor Selection

- NMSC
NMSC

Most commonly treated with SRT

• Basal Cell Carcinoma

• Squamous Cell Carcinoma
Tumor Site

- SRT may be used to treat tumors on all skin surface areas

- However, lesions on the central face are at higher risk of recurrence
SRT may give a better cosmetic outcome:

- Scalp
- Eyelid
- External ear canal and helix
- Nasal ala
Large Tumors

- SRT may present a simpler option than extensive surgery and reconstruction (skin grafting)
Important factors to consider

- Treatment margin

- 8-10mm margins are common for BCC

- 10mm is used for SCC.

- Ill-defined and more aggressive tumors may warrant a wider margin.
Factors Affecting Eradication of Tumor

• Radio sensitivity
• Tolerance of surrounding normal tissue.
• Tissue toxicity factors:
  - size and volume of the area
  - vascularity
  - underlying and supporting tissues.
Factors Affecting SRT Dosage for NMSC and Prognosis

• Histological subtype - certain subtypes confer higher risk of recurrence (ex. morpheaform and basosquamous)

• Histological features of aggression - perineural and/or perivascular involvement confers higher risk of recurrence
Factors Affecting SRT Dosage for NMSC and Prognosis

- Failure of previous treatment - recurrent lesions are at higher risk of further recurrence
- Immunosuppression - possibly confers increased risk of recurrence

Nguyen T et al, Nonmelanoma skin cancer Current Treatment Options in Oncology, 2002
Ideal Patients for SRT

- Elderly
- Poor surgical candidates
Indications for SRT

• Medically unfit for surgery/limiting diseases

• Contraindications for anesthesia

• Potential for significant cosmetic, neural or functional limitations post op
Indications for SRT

• Poor Wound Healing

• Poor Functional Status or Disabilities

• Need for Simultaneous Treatment of Multiple Tumors

• Inability to Perform Necessary Post-Operative Wound Care
Limiting: Systemic Diseases

- CHF
- Cardiac Disease
- Poor Local Circulation
- Pacemakers
- Pulmonary Disease
- Requires O₂
Limiting: Systemic Diseases

- PVD
- Bleeding Disorder
- Anticoagulation
- Immune suppression
- Diabetes
- Advanced Dementia
SRT Ideal for Poor Surgical Candidates

• Prefer not to be treated by surgery

• Decline surgical intervention

• Exhibit significant fear of surgery and scarring

• Not likely to tolerate surgery
Contraindications for SRT

- Pacemaker or defibrillator within the treatment area
- Previous radiation therapy to the area of concern
Factors to Consider Prior to Selecting SRT

• Past injury to the dermis

• Areas that have been burned, frozen, scared, or that have had any chemical change done to the areas at a cellular level.
Reference

Consensus Guidelines

- Nestor MS, Berman BB, Goldberg D, Cognetta AB, Gold M, Roth W, Cockerell CJ, Glick B
- J Clin Aesthet Dermatol. 12: 2019