COMPLICATIONS OF BRACHYTHERAPY

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DEFINITION OF COMPLICATION & BRACHYTHERAPY

In medicine, a medical problem that occurs during a disease, or after a procedure or treatment. The complication may be caused by the disease, procedure, or treatment or may be unrelated to them.

brachytherapy

A type of radiation therapy in which radioactive material sealed in needles, seeds, wires, or catheters is placed directly into or near a tumor. Also called implant radiation therapy, internal radiation therapy, and radiation brachytherapy.

More Information

Brachytherapy to Treat Cancer
## CASARETT'S CLASSIFICATION OF MAMMALIAN CELL RADIOSensitivity

<table>
<thead>
<tr>
<th>Cell Type</th>
<th>Properties</th>
<th>Examples</th>
<th>Sensitivity^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Vegetative intermitotic cells</td>
<td>Divide regularly, no differentiation</td>
<td>Erythroblasts, intestinal crypt cells</td>
<td>High</td>
</tr>
<tr>
<td>II Differentiating intermitotic cells</td>
<td>Divide regularly; some differentiation between divisions</td>
<td>Germinal cells of epidermis Myelocytes</td>
<td></td>
</tr>
<tr>
<td>Connective tissue cells</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III Reverting postmitotic cells</td>
<td>Do not divide regularly; variably differentiated</td>
<td>Liver</td>
<td></td>
</tr>
<tr>
<td>IV Fixed postmitotic cells</td>
<td>Do not divide; highly differentiated</td>
<td>Nerve cells, muscle cells</td>
<td>Low</td>
</tr>
</tbody>
</table>

^a Sensitivity decreases for each successive group  
^b Intermediate in sensitivity between groups II and III
ORDER OF RADIOSENSTIVITY

LOW

FPM  FIXED POSTMITOTIC CELLS

RPM  REVERTING POSTMITOTIC CELLS

HISTOHEMATIC BARRIER
MICROCIRCULATION

MULTIPOTENTIAL CONNECTIVE TISSUE CELLS

DIM  DIFFERENTIATING INTERMITOTIC CELLS

VIM  VEGETATIVE INTERMITOTIC CELLS

HIGH
RAPIDLY PROLIFERATING TISSUE, ACUTE TOXICITY

RAPID CELL RENEWAL KINETICS

RADIATION

RECOVERY

SLough

Edema and Inflammation

Occlusion

Dilation and Constriction

MC

HHB

FIB
SLOW RENEWAL KINETICS, LATE TOXICITY

SLOW CELL RENEWAL KINETICS

Radiation

Recovery

Edema and Inflammation

HHB

FIB

Basement membrane

Occlusion

Narrowing

Dilation and Constriction

Vascular stroma

Parenchymal

RPM

HHB

MC
FACTORS PREDICTING THE COMPLICATIONS IN BRACHYTHERAPY

- DOSE PER FRACTION
- NO OF FRACTIONS
- INTERFRACTION INTERVAL
- TOTAL DOSE
- IMPACT ON TYPE OF TISSUES
- RADIATION TECHNIQUES
SCOPE OF BRACHYTHERAPY

- CARCINOMA HEAD AND NECK: - INTERSTITIAL, SURFACE MOULD, INTRA CAVITARY
- ESOPHAGUS, BRONCHUS: - INTRALUMINAL
- BREAST: - INTERSTITIAL/INTRA CAVITARY
- CERVIX: - INTRACAVITARY, INTERSTITIAL
- PROSTATE: - INTERSTITIAL: - PERMANENT/TEMPORARY
- ANAL CANAL/RECTUM: - INTRALUMINAL
Complications due

- BRACHYTHERAPY PROCEDURE
- RADIATION.
I. Hemorrhage – Primary And Secondary
II. Infection
III. Airway Complications – Aspiration
IV. Venous Thrombosis
MINIMIZING PROCEDURAL COMPLICATIONS

- Co-ordinated efforts of well-informed team of a radiation onco-ologist, anesthesiologist, head and neck surgeons, plastic surgeons, a dental surgeon, and physicists.
- Pre implant assessment.
- Meticulously planned placement of the applicator/catheter, drain and tracheostomy and wound closure techniques.
- Proper placement of drain so that it will never interfere with loading and unloading procedures.
- Coordination of the wound closure procedure will minimize any potential tension, damage, and distortion of the implanted catheters and its geometry.
- Proper post op care by trained nursing personnel to avoid infection and wound complications that allows sufficient fibroblast to proliferate in extremity sarcomas.
- Following completion of the brachytherapy, removal of the catheters should be done with the coordination of the head and neck surgical team if needed.
- Arterial hemorrhage- during the removal of the implanted catheters, can be effectively controlled with bidigital compression.
ACUTE COMPLICATIONS AND THEIR MANAGEMENT, HEAD AND NECK

◊ PAIN
◊ MUCOSAL EDEMA
◊ MUCOSITIS

The patient and the family need to be informed about the course of the radiation effects and optimal home care measures. Home care recommendations include:

1. ORAL RINSES WITH 1–2 % BICARBONATE EVERY 1–2 H WHILE AWAKE.
2. KEEP IMPLANT EXIT SITES CLEAN AND DRY; AVOID LOTIONS.
3. WASHING AND SHOWERING FACE AND NECK STARTING 24 H AFTER IMPLANT REMOVAL.
4. ORAL INTAKE – ADVANCE AS TOLERATED FOR PATIENTS WHO CAN SWALLOW.
5. DIETARY SUPPLEMENTATION AND FEEDING TUBE SUPPORT AS NEEDED.
6. TRACHEOSTOMY SITE – KEEP CLEAN AND DRY; DRESS DAILY OR MORE OFTEN IF NEEDED.
CHRONIC COMPLICATIONS
HEAD AND NECK

- OSTEORADIOECROSIS
- CRANIAL NEUROPATHY
- TRISMUS
- SWALLOWING AND SPEECH DIFFICULTIES
- SECONDARY MALIGNANCIES
SOFT TISSUE NECROSIS AND OSTEO RADIONECROSIS

- Greater incidence of soft tissue necrosis and osteoradionecrosis with brachytherapy than with EBRT.

- Depends on:
  - TOTAL DOSE RECEIVED
  - PROXIMITY TO BONE
  - DENTAL EXTRACTION

![Radiation Timing Diagram]

- Radiation: 4~6 weeks
- Onset of ORN: 2~5 years
- Time:

![X-Ray Image of Tooth]

- Arrow indicates affected tooth.
# Osteoradionecrosis of jaw

**Characteristics**

Irradiated bone becomes *devitalized* and exposed through the overlying skin or mucosa without healing for 3 months, without recurrence of tumor

*Most cases happen in mandible*

70-94% of cases developed within the first 3 years after radiotherapy

**Risk factors**

Hyperfractionated irradiation regimen - High total dose (6000-7000cGy)

Recent reports have suggested that when chemotherapy is added to radiotherapy the incidence of ORN may be increased

Pre-irradiation and *post-irradiation* dental extractions

Poor oral hygiene with periodontal disease

Tobacco and alcohol use

**Conservative treatment**

- Improve oral hygiene
- Minimal surgical debridement
- Hyperbaric oxygen therapy (HBOT)
- Medical management: pentoxifylline, tocopherol
Treatment options of ORN

Previous Treatment

- Surgery
- HBOT
- Antibiotics

New Treatment

- Pentoxifylline
- Tocopherol
<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No change over baseline</td>
</tr>
<tr>
<td>1</td>
<td>Mild dysphagia or odynophagia; may require topical anesthetic, non-narcotic agents, or soft diet</td>
</tr>
<tr>
<td>2</td>
<td>Moderate dysphagia or odynophagia; may require narcotics agents or pure/liquid diet</td>
</tr>
<tr>
<td>3</td>
<td>Severe dysphagia or odynophagia with dehydration or weight loss (&gt;15% from pretreatment baseline) requiring nasogastric feeding tube, intravenous fluids, or hyperalimentation</td>
</tr>
<tr>
<td>4</td>
<td>Complete obstruction, ulceration, perforation, or fistula</td>
</tr>
</tbody>
</table>
RTOG GRADING OF TRISMUS

3-Finger Basic Diagnostic

Severe
SEVERE
< 1 Finger

Moderate
Mild to Mod
< 2 Fingers

Mild

> 3 Fingers
“Normal” MIO

Pointer Finger

Middle Finger
Non-Dominant Hand

Ring Finger

45-55mm is the
FEMALE avg. adult MIO.

50-60mm is the
MALE avg. adult MIO.

The 3-Finger method generally accounts for body size, the primary determination of MIO. Normal MIO is about the height of a person’s pointer, middle, and ring finger on their NON-DOMINANT hand.
SECOND MALIGNANCY

➢ INCIDENCE ≈20% OF PATIENTS WITH HEAD AND NECK CANCERS.
➢ LUNG, ESOPHAGUS, AND HEAD AND NECK SITES MUST BE MONITORED FOR SECOND PRIMARY.
➢ THE PATIENTS MUST BE FOLLOWED CAREFULLY FOR LIFE, SCREENED, AND EVALUATED FOR RECURRENCE OF THE ORIGINAL PRIMARY, WHICH TENDS TO OCCUR EARLIER, AND A SECOND NEW PRIMARY CANCERS, WHICH TEND TO OCCUR LATER THAN RECURRENCES. THE DISTINCTION MAY BE DIFFICULT IN PATIENTS WITH ADJACENT RECURRENCES, SIMILAR HISTOLOGY, AND MODERATELY LONG DISEASE FREE INTERVALS.
➢ WHILE HYPOPHARYNX HAS THE HIGHEST RATE FOR SECOND MALIGNANCY, LARYNX HAS THE LOWEST RATE. HOWEVER, BOTH SITES HAVE THE PROPENSITY TO BE ASSOCIATED WITH BRONCHOCYSTIC CARCINOMA.
➢ THE MOST COMMON SITE FOR THE SECOND PRIMARY CANCERS FOR ORAL CAVITY AND OROPHARYNX PRIMARIES IS A NEW HEAD AND NECK CANCER.
➢ MEASURES TO HELP THE PATIENT AVOID SMOKING, DRINKING, AND HPV EXPOSURE ARE GENERAL HEALTH IMPROVEMENTS THAT FAVORABLY IMPACT ON OUTCOME.

CRANIAL NEUROPATHY

CRANIAL NEUROPATHY, ALTHOUGH UNCOMMON, MORE COMMONLY WITH BRACHYTHERAPY THAN WITH EBRT. THE NERVES AT MOST RISK ARE THE HYPOGLOSSAL FOR TONGUE IMPLANTS AND THE VAGUS, GLOSSOPHARYNGEAL NERVES, AND SYMPATHETIC CHAIN FOR NECK IMPLANTS.
ACUTE SIDE EFFECTS OF INTERSTITIAL BREAST BT INCLUDE
- HEMATOMA FORMATION,
- EDEMA,
- INFECTION,
- ACUTE RADIATION DERMATITIS (MAINLY LIMITED TO THE NEEDLE PUNCTURE SITES), AND
- MASTALGIA

THE RATE AND SEVERITY OF THESE EARLY COMPLICATIONS ARE LOW AND CLINICALLY NEGLIGIBLE.

LATE SIDE EFFECTS ARE
- SKIN TELANGIECTASIA >1 CM²,
- MODERATE AND SEVERE SUBCUTANEOUS FIBROSIS,
- SYMPTOMATIC FAT NECROSIS
HOW TO AVOID COMPLICATIONS

- The rate of telangiectasia is highly dependent on the dose delivered to the subcutaneous small vessels beneath the skin.
- Late skin side effects occurred if not using any skin dose constraints or dose optimization.
- Larger bra cup size was significantly associated with the incidence of fat necrosis.
- Within the range of small- to intermediate-volume implants (up to 160 cm³), neither implant volume (V100%), volume of high-dose region (V150%, V200%), or dose inhomogeneity is associated with an increased risk of subcutaneous toxicities.
- However, with large-volume implants (>160 cm³), larger high-dose regions are correlated with a higher incidence of fat necrosis, and the absolute volume of the high-dose region seems to be associated with the risk of subsequent fat necrosis.
- That open biopsy should be avoided when possible, as core biopsy and MRI are useful for differentiating fat necrosis from LR.
- Overall implant volume should be limited, and more importantly, the high-dose volume (e.g., V150% and V200%) should be minimized keeping the dose distribution as homogenous as possible (e.g., keeping the DNR below 0.30 or DHI above 0.70).
<table>
<thead>
<tr>
<th>Grading</th>
<th>Acute toxicity</th>
<th>Late toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>G0</td>
<td>No change over baseline</td>
<td>None</td>
</tr>
<tr>
<td>G1</td>
<td>Follicular, faint or dull erythema, epilation,</td>
<td>Slight atrophy, pigmentation change, some hair loss</td>
</tr>
<tr>
<td></td>
<td>dry desquamation, decreased sweating</td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>Tender or bright erythema, patchy moist desquamation,</td>
<td>Patch atrophy, moderate, telangiectasia, total hair loss, induration</td>
</tr>
<tr>
<td></td>
<td>moderate edema</td>
<td></td>
</tr>
<tr>
<td>G3</td>
<td>Confluent, moist desquamation other than skin folds,</td>
<td>Market atrophy, gross telangiectasia, fibrosis</td>
</tr>
<tr>
<td></td>
<td>pitting edema</td>
<td></td>
</tr>
<tr>
<td>G4</td>
<td>Ulceration, hemorrhage, necrosis</td>
<td>Ulceration or necrosis</td>
</tr>
</tbody>
</table>
CA PROSTATE: COMPLICATIONS OF BRACHYTHERAPY

- PERMANENT SEED IMPLANTS
- URINARY
  - FREQUENCY
  - OBSTRUCTIVE UROPATHY
  - INCONTINENCE
- BOWEL
  - PROCTITIS
- SEXUAL DYSFUNCTION.
URINARY COMPLICATIONS OF PROSTATE BRACHYTHERAPY

• MAJORITY OF PATIENTS WHO DEVELOP COMPLICATIONS I.E URETHRITIS WITH INCREASED URINARY FREQUENCY AND OBSTRUCTIVE AND IRRITATIVE SYMPTOMS WHICH START A FEW DAYS POST IMPLANT AND MAY PERSIST UP TO 6–9 MONTHS AFTER.
• THE SYMPTOMS FOR 90 % OF MEN RESOLVE AT 1 YEAR ONCE MOST OF THE TOTAL DOSE IS DELIVERED.
• ACUTE URINARY RETENTION HAPPENS IN 5–10 % OF PATIENTS. IT SHOULD BE MANAGED CONSERVATIVELY IN THE FIRST INSTANCE WITH ALPHA-BLOCKERS AND INTERMITTENT SELF-CATHETERIZATION OR CONTINUOUS DRAINAGE WITH A FOLEY CATHETER.
• THE PROBABILITY OF DEVELOPING ACUTE RETENTION CORRELATES WITH THE PRETREATMENT IPSS SCORE AND PROSTATE SIZE AND IS RELATED TO PRIOR USE OF ALPHA-BLOCKING DRUGS, TOBACCO USE, AND AGE.
• RETENTION NORMALLY RESOLVES WITHIN THE FIRST YEAR AND SHOULD BE TREATED CONSERVATIVELY.
• IF A TURP IS PERFORMED IN THE FIRST YEAR POST-TREATMENT, THERE IS A HIGHER RISK OF URINARY INCONTINENCE.
CHRONIC URINARY MORBIDITY CAN OCCUR SECONDARY TO EXCESSIVE IRRADIATION OF THE BLADDER NECK OR PROSTATIC URETHRA. RTOG GRADE 3 TOXICITY IS REPORTED IN 1–3 % OF TREATED PATIENTS AND URETHRAL STRICTURE RATES ARE UP TO 12 %.

LONGTERM INCONTINENCE IS STRONGLY ASSOCIATED WITH PREVIOUS TURP SURGERY, WITH UP TO 20 % INCONTINENCE RATES IN THE GROUP WHO UNDERWENT TURP VERSUS 1 % WITHOUT TURP IN ONE SERIES. NEWER EVIDENCE IS EMERGING WHICH MAY SUPPORT POST TURP IMPLANTATION IN SELECTED CIRCUMSTANCES.
PROCTITIS AND SEXUAL DYSFUNCTION

- CHRONIC RADIATION PROCTITIS IS RARE, SEEN IN LESS THAN 5% OF PATIENTS.
- PRESENT 6 MONTHS POST IMPLANT WITH RECTAL BLEEDING, RECTAL URGENCY, RECTAL INCONTINENCE, AND PAIN.
- RATES OF RECTAL FISTULAS ARE LOW, AROUND 0.6%.
- THE DISTANCE BETWEEN POSTERIOR SEEDS IMPLANTED AND THE ANTERIOR RECTAL WALL IS CORRELATED WITH RECTAL TOXICITY, AND IMPROVED TECHNOLOGY IN IMPLANT POSITIONING ACCURACY HAS IMPROVED RATES OF TOXICITY.

- ERECTILE DYSFUNCTION RATES ARE GENERALLY LOWER WITH PERMANENT SEED IMPLANTS COMPARED TO OTHER TREATMENT MODALITIES.
- THE RATE OF ERECTILE DYSFUNCTION HAS A SIGNIFICANT CORRELATION WITH PREIMPLANT ERECTILE STATUS.
- THIRTY PERCENT OF MEN POTENT PRIOR TO THE IMPLANT WILL DEVELOP IMPOTENCE BUT 60% WILL RESPOND TO PHOSPHODIESTERASE INHIBITORS.
<table>
<thead>
<tr>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute genitourinary toxicity</strong></td>
<td>Frequency of urination or nocturia twice pretreatment habit/disuria or urgency not requiring medication</td>
<td>Frequency of urination is less frequent than every hour (day: 12–16 times; nocturia 5–8 times)/disuria, urgency, bladder spasm requiring local anaesthetic</td>
<td>Frequency of urination is more frequent than every hour (day: &gt;16 times; nocturia &gt;8 times)/disuria, bladder spasm/urgency requiring frequent regular narcotic/gross haematuria/complaints requiring permanent or suprapubic catheter</td>
</tr>
<tr>
<td><strong>Late genitourinary toxicity</strong></td>
<td>Frequency during day 0.5–1 h; nocturia 2–3/night; slight dysuria or microscopic haematuria requiring no medication; slight epithelial atrophy, minor teleangiectasia; bladder capacity &gt; 300 cm³</td>
<td>Frequency during day 1–2 h; nocturia 4–6/night; Moderate dysuria or intermittent (mild, moderate) haematuria requiring medication; moderate teleangiectasia; bladder capacity 150–300 cm³</td>
<td>Haematuria requiring transfusion/obstruction not due to clots/ulceration/necrosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequent during day &gt;2 h; nocturia &gt;6/night; severe dysuria/frequent (severe) haematuria/severe teleangiectasia; bladder capacity 100–150 cm³; benign urethral strictures requiring a TURP, dilatation, suprapubic or permanent catheter</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Necrosis; severe haemorrhagic cystitis; bladder capacity: &lt; 100 cm³</td>
<td></td>
</tr>
</tbody>
</table>

TURP = transurethral resection of the prostate.
<table>
<thead>
<tr>
<th>RTOG/EORTC grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 0</td>
<td>No symptoms</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Mild diarrhea, mild cramping, bowel movement five times daily. Slight rectal discharge or bleeding</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Moderate diarrhea and colic bowel movement $&gt;5$ times daily. Excessive rectal mucus or intermittent bleeding</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Obstruction or bleeding requiring surgery</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Necrosis/perforation/fistula</td>
</tr>
</tbody>
</table>

RTOG, Radiation Therapy Oncology Group; EORTC, European Organization for Research and Treatment of Cancer.
### Complications of Brachytherapy in CA Cervix

<table>
<thead>
<tr>
<th>Acute</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uterine perforation</td>
<td>Proctitis</td>
</tr>
<tr>
<td>Vaginal laceration</td>
<td>Ulceration of bladder or rectum</td>
</tr>
<tr>
<td>Fever</td>
<td>Fistula</td>
</tr>
<tr>
<td>Thrombotic events</td>
<td>Stricture</td>
</tr>
<tr>
<td>Anesthesia-related nausea</td>
<td>Vaginal stenosis</td>
</tr>
<tr>
<td>Grade</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Mild and self-limiting</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Managed conservatively, lifestyle (performance status) not affected</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Severe, alters patient lifestyle</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Life threatening and disabling</td>
</tr>
</tbody>
</table>
MORE COMMONLY PATIENTS MAY EXPERIENCE CHRONIC RECTAL AS A RESULT OF RADIATION PROCTOPATHY.

IN THE ERA OF 2-DIMENSIONAL BRACHYTHERAPY, THE INCIDENCE OF MILD TO SEVERE RECTAL BLEEDING RANGED FROM 5 TO 30%.

SEVERE RECTAL BLEEDING: 2% OF PATIENTS TREATED WITH CT-BASED BRACHYTHERAPY AS COMPARED TO 13% OF THOSE TREATED WITH CONVENTIONAL 2-DIMENSIONAL BRACHYTHERAPY PLANNING, P = 0.02.

FOR PATIENTS EXPERIENCING MILD TO MODERATE BLEEDING, CONSERVATIVE MANAGEMENT WITH CORTICOSTEROID, SUCRALFATE, OR MESALAMINE ENEMAS IS EFFECTIVE IN >70–80% OF PATIENTS.

SHOULD BLEEDING PERSIST OR INCREASE IN SEVERITY, ENDOSCOPIC EVALUATION WITH INTRARECTAL THERMAL OR PHOTOCOAGULATION IS THE MOST EFFECTIVE MEANS OF REDUCING MODERATE TO SEVERE BLEEDING.

VAGINAL STENOSIS REMAINS A SIGNIFICANT SOURCE OF MORBIDITY WITH MOST PATIENTS (UPWARDS OF 90%) EXPERIENCING MILD TO MODERATE VAGINAL MORBIDITY MOST COMMONLY MANIFESTED AS VAGINAL STENOSIS OR DRYNESS.

DILATOR USE REMAINS AN IMPORTANT PART OF MITIGATING RISKS OF VAGINAL STENOSIS.
WITH INCREASED ADOPTION OF IMAGE-BASED BRACHYTHERAPY, RISK OF SEVERE COMPLICATIONS REDUCED BY MORE THAN HALF THAT ARE SEEN WITH TWO-DIMENSIONAL FILM-BASED BRACHYTHERAPY;

• UP TO 5–10% WILL STILL EXPERIENCE SEVERE GRADE 3+ COMPLICATIONS.
• THE MOST SEVERE COMPLICATION IS RECTOVAGINAL OR VESICOVAGINAL FISTULAE.

MANAGEMENT TYPICALLY INCLUDES IMAGING (WITH CONTRAST-ENHANCED PELVIC MRI WITH WATER-BASED VAGINAL GEL REPRESENTING THE PREFERRED MODALITY) AND EXAM UNDER ANESTHESIA TO CONFIRM THE PRESENCE OF A FISTULA AND RULE OUT RECURRENT DISEASE. WHILE IT IS IMPORTANT TO CONFIRM DISEASE RECURRENCE IN THE SETTING OF FISTULAE AS THIS OFTEN DIRECTS MANAGEMENT.

• ONCE A FISTULA IS CONFIRMED, FECAL OR URINARY DIVERSION IS WARRANTED, WITH THE TYPE OF DIVERSION INDIVIDUALIZED BASED ON PATIENT PERFORMANCE STATUS, DISEASE STATUS, EXTENT OF PRIOR RADIOTHERAPY, BOWEL HEALTH, AND OTHER FACTORS. IN THE ABSENCE OF RECURRENT DISEASE, HYPERBARIC OXYGEN MAY PROMOTE FISTULA HEALING. LESS COMMONLY COMPLEX SURGICAL REPAIR MAY BE ATTEMPTED ESPECIALLY FOR VESICOVAGINAL FISTULAE; HOWEVER THE SUCCESS RATE IS SIGNIFICANTLY REDUCED IN A PREVIOUSLY IRRADIATED FIELD RANGING FROM 40 TO 100% AND MUST BE BALANCED WITH INCREASING RISKS OF SURGICAL COMPLICATIONS.
TAKE HOME MESSAGE
PREVENTION IS BETTER THAN CURE

- PROPER PLACEMENT OF THE APPLICATOR / CATHETER
- UNDERSTANDING THE RADIOBIOLOGY OF ORGAN CONCERNED
- PROPER DOSE FRACTIONATION SCHEDULE
- PROPER DOSIMETRY
- ORAL AND DENTAL HYGIENE
- PER OPERATIVE AND POST OPERATIVE CARE