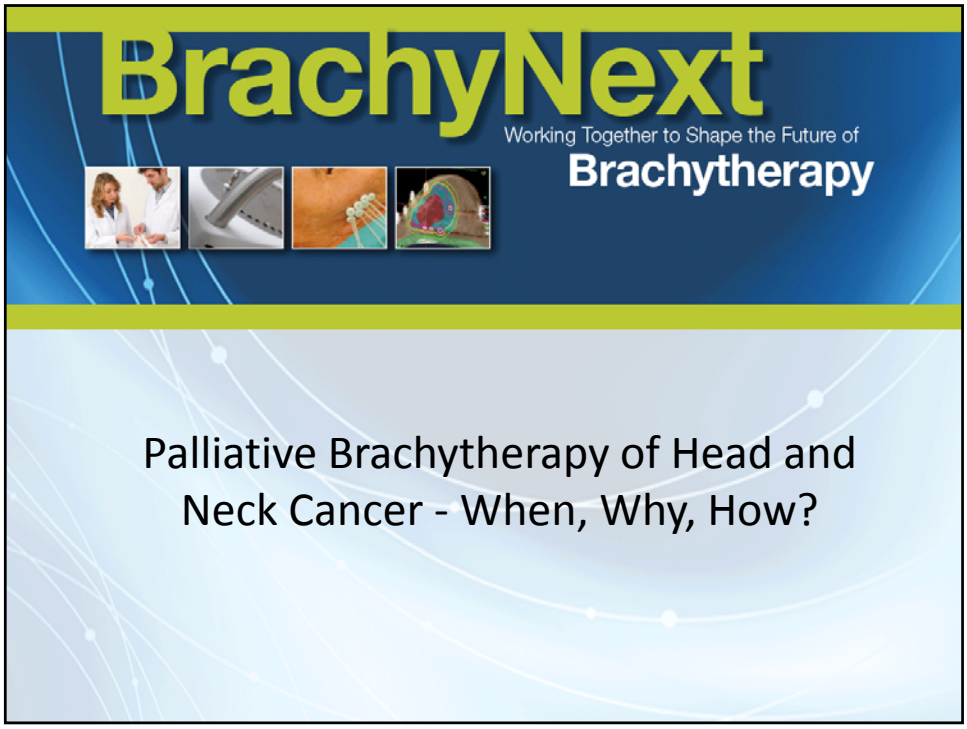

Palliative Brachytherapy of Head and Neck Cancer - When, Why, How?

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Disclosure

Antonio Cássio Assis Pellizzon, MD, PhD, MSc, does not have any financial relationships or products or devices with any commercial interest related to the content of this activity of any amount during the past 12 months.

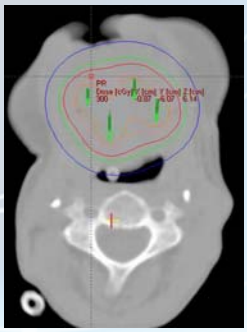
Introduction

- Re-irradiation is generally not considered the first line approach for managing recurrent or second primary (re-HNC)
- Intimate anatomic relation between disease and critical structures often makes surgical re-resection impossible or inadequate

Goodwin
Laryngoscope 2000;110:1–18.

Overview

- Curative therapeutic options → limited
- No well-defined guidelines
- Decision is based on
  - clinician's preferences
  - patient's general condition
  - desire for further therapy
  - availabilities of therapy



Context - Indications

- Local control
- Symptoms release
- Quality of life improvement
- Stop bleeding

Gerbaulet **et al.**
The GEC ESTRO handbook of BCT
ESTRO, Brussels, Belgium (2002)

Re-RT

- 5-year survival rates → curative intent
  - 13% unselected series
  - 93% highly selected series

Kao et al.
Reirradiation of recurrent and second primary H&N malignancies: a comprehensive review.
Cancer Treat Rev 2003;29:21–30.

Re - RT

- Brachytherapy
  - high dose to a limited volume
- EBRT – IMRT or SBRT
- IORT – Electrons and HDR

Pellizzon et al.
Predictive Factors Related to Salvage EBRT Re-RT for RecurrentNHNSCC after Primary Radical Therapy
SJM&CT, 2012(1):1-13

Why Brachy???

- Does it represent a method of choice?
- Can BT overcome IMRT and SBRT limitations?
- Does BT provide specific intensive local irradiation?
- Is it possible to protect surrounding structures - preserving organ function?
- Is there a a good palliative effect ?

Best Candidates

- Careful review of each individual case
- Physical condition
- Emotional condition
- Experience of the treating team
- Available treatment facilities

Pellizzon et al.
Head Neck. 2005 Dec;27(12):1035-41.

Best Candidates

- Histologically confirmed recurrent
- Nonresectable tumor
- No evidence of distant metastases
  - Radical re-RT
- Prior plan of radiation therapy ready
  - to limit risk of radionecrosis
- Availability for BT techniques

Pellizzon et al.
Head Neck. 2005 Dec;27(12):1035-41.

Rational of BT indications
Radical salvage treatments

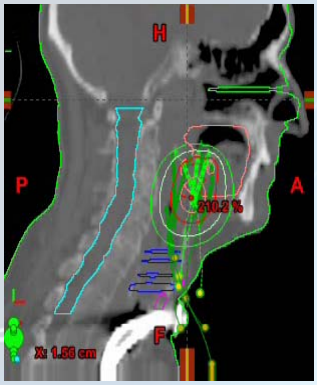
- reductions in normal tissue doses decreasing probability of:
  - acute complications
  - late complications

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27.

Ctahethers Insertion

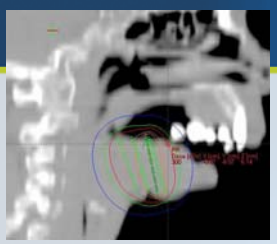
Planning

- Target
  - 3-5 mm beyond the GTV
  - OR delineated
  - Special attention to
    - carotid vessels
    - spinal cord



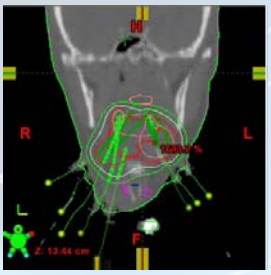
Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27.

Planning



CT-based
image fusion CT+ MR

Optimization
standard geometric optimization



Prescription
Inverse planning

Others:
modified Paris dosimetry
MPD – minimum peripheral dose

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27.

Literature Review

Radiation Oncology
BioMed Central

Research

Open Access

Salvage for cervical recurrences of head and neck cancer with dissection and interstitial high dose rate brachytherapy

Antonio Cassio Assis Pellizzon*[1], João Victor Salvajoli[1], Luiz Paulo Kowalski[2] and Andre Lopes Carvalho[2]

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27.

Table 1: Characteristics of patients with cervical recurrences and local control of the tumor primary site

Variables	n. pacients	%	median
Age			53.5
< 65 years	15	71.4	
≥ 65 years	6	28.6	
Gender			
Male	16	76.2	
Female	5	23.8	
Primary Tumor Site			
Cervical	1	4.8	
Face (skin SCC)	4	19.0	
Pharynx	10	47.6	
Oral cavity	6	28.6	
Lymph node mobility			
Mobile	12	57.1	
Reduced	6	28.6	
Fixed	3	14.3	
Previous Radiation			
Yes	15	71.4	
No	6	28.6	
Previous Chemotherapy			
Yes	01	4.8	
No	20	95.2	
Total	21	100	

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27.

Table 2: Doses and Biological Effective Doses for all patients

	Dose (Gy)			
	EBRT	Second EBRT	I-HDR	Nominal Dose EBRT + I-HDR
N	21	15	21	21
Median	45.0	30.0	21.0	65.0
SD	14.0	9.3	10.3	11.6
Min.	30.0	25.0	7.0	46
Max.	66,0	50.0	42.0	105.0

Legend – n – number; SD – standard deviation; Min – minimum; Max – maximum

BED (Gy_{10})			
EBRT	I-HDR	Second EBRT	Total
53.1	31.0	35.4	119.5
13.8	17.9	10.9	42.6
53.1	13.0	29,5	95.6
86.1	91.0	59.0	236

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27.

21 patients 1994-2004

LC - crude - 52.4%

5- and 8-years OS 50% - 42.5%

Local relapse free - 42.9% 28.6%

Predictive Factor
- **negative margin status**

DSS (p = 0.0007)

LRFS (p = 0.0002)

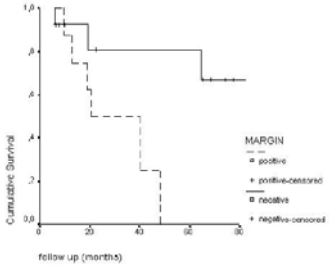


Figure 4
Kaplan Meier local relapse-free survival estimates by margin status.

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27.

Strahlentherapie
und Onkologie
Original Article

Reirradiation for Recurrent Neck Metastases of Head-and-Neck Tumors Using CT-Guided Interstitial ^{192}Ir HDR Brachytherapy

Christos Kolotas[1], Nikolaos Tselis[1], Manon Sommerlad[2], Sandra Röddiger[1], Thomas Schnabel[3], Dimos Baltas[4], Anna Kalogera-Fountzila[5], George Fountzilas[5,6], Nikolaos Zamboglou[1]

Table 1. Initial and recurrent tumor characteristics.

Initial tumor stages	21/49 (43%) T1–T2 28/49 (57%) T3–T4 or Tx 38/49 (77%) N+
Primary tumor site	9/49 (18%) oral cavity (1/49 T1, 4/49 T2, 3/49 T3, 1/49 T4) 22/49 (46%) oropharynx (2/49 T1, 3/49 T2, 12/49 T3, 5/49 T4) 10/49 (20%) hypopharynx (3/49 T1, 3/49 T2, 3/49 T3, 1/49 T4) 7/49 (14%) larynx (2/49 T1, 3/49 T2, 1/49 T3, 1/49 T4) 1/49 (2%) Unknown
Recurrent tumor histology	32/49 (65%) squamous cell carcinoma 7/49 (14%) adenoid-cystic carcinoma 10/49 (20%) adenocarcinoma
Recurrent tumor volume	Median 57 cm³ (15–452 cm³), mean 96 cm³

Kolotas et al.
Strahlenther Onkol. 2007 Feb;183(2):69-75.

Table 2. Implant characteristics.
Tabelle 2. Kenndaten der durchgeführten Implantationen.

Mean dose	31.5 Gy (30–36 Gy)
Dose/fraction	3 Gy
Fraction/day	2
Number of fractions	10.4 (10–12)
Volume	96 cm³ (15–452 cm³)

Figure 1. CT-guided interstitial brachytherapy implant in cervical

Kolotas et al.
Strahlenther Onkol. 2007 Feb;183(2):69-75.

LC @ 19 months - 69% with a median Survival of 14 months

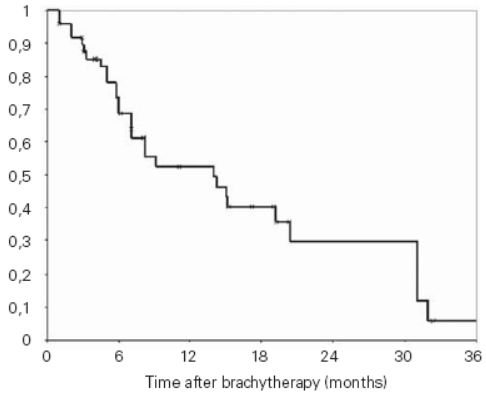


Figure 3. Post-brachytherapy survival.

Kolotas et al.
Strahlenther Onkol. 2007 Feb;183(2):69-75.

Study Conclusions

1995-1999, 49 patients
previous RT - mean dose 54 Gy (45-80 Gy).
36 (73%) → surgery
26 (53%) → CHT

HDR 30 Gy 10 fx (75%) and 36 Gy -12 fx (25%). - 3 Gy BID

Objective Response rate - 83% (41/49)
complete remission 20% (10/49)
partial remission 63% (31/49)
no response - 17% (8/49)

LC @ 19 months - 69% with a median Survival of 14 months

Kolotas et al.
Strahlenther Onkol. 2007 Feb;183(2):69-75.

ANTICANCER RESEARCH
International Journal of Cancer Research and Treatment
Interstitial HDR Brachytherapy for Advanced Recurrent Squamous Cell Carcinoma of the Head and Neck
Anticancer Res January 2013 33 (1) 249-252

- 12 patients advanced recurrences
- FX -2-3 Gy → total 20-33 Gy.
- Survival - shortest survival 4 weeks
  - longest 4 years

Wiegand et al.
Anticancer Res. 2013 Jan;33(1):249-52.

ELSEVIER

BRACHYTHERAPY

Brachytherapy 11 (2012) 137–143

High-dose-rate and pulsed-dose-rate brachytherapy in palliative treatment of head and neck cancers

Anna Bartochowska[1,*], Małgorzata Wierzbicka[1], Janusz Skowronek[2], Małgorzata Leszczyńska[1], Witold Szyfter[1]

[1]*Department of Otolaryngology, Poznań University of Medical Sciences, Poznań, Poland*
[2]*Department of Brachytherapy, Greater Poland Cancer Center, Poznań, Poland*

Table 1
Patient characteristics

Characteristic	Number (percentage) of patients, *n* (%)		
		Method of treatment	
		Pulsed-dose-rate brachytherapy	High-dose-rate brachytherapy
Age	Median, 59 y		
<59	82 (52.6)		
≥59	74 (47.4)		
Gender			
Male	133 (85.2)		
Female	23 (14.8)		
Primary tumor localization			
Larynx, hypopharynx	72 (46.2)	53 (73.6)	19 (26.4)
Larynx	37 (23.7)		
Hypopharynx	12 (7.7)		
Larynx, hypopharynx	23 (14.8)		
Floor of mouth/tongue	40 (25.6)	23 (57.5)	17 (42.5)
Oropharynx	27 (17.3)	18 (66.7)	9 (33.3)
Paranasal sinuses	6 (3.8)	3 (50)	3 (50)
Carcinoma of unknown primary	5 (3.2)	4 (80)	1 (20)
Salivary glands	4 (2.6)	4 (100)	—
Nasopharynx	2 (1.3)	1 (50)	1 (50)
Histopathology			
Squamous cell carcinoma	145 (93)		
Solid carcinoma	3 (1.9)		
Cylindroma	2 (1.3)		
Lymphoma/squamous cell carcinoma	2 (1.3)		
Lymphoepithelioma	2 (1.3)		
Malignant melanoma	1 (0.6)		
Oncocytoma	1 (0.6)		
Primary treatment			
Surgery, radiotherapy	101 (64.7)		
Radiotherapy	25 (16)		
Surgery	12 (7.7)		
Surgery, radiotherapy, chemotherapy	10 (6.5)		
Radiotherapy, chemotherapy	6 (3.8)		
Surgery, chemotherapy	2 (1.3)		
Recurrent tumor localization			
Cervical lymph nodes	84 (54.2)	65 (77.4)	19 (22.6)
Oropharynx	43 (27.6)	21 (48.8)	22 (51.2)
Tracheostomy region	22 (14.1)	16 (72.7)	6 (27.3)
Paranasal sinuses	4 (2.6)	2 (50)	2 (50)
Salivary glands	2 (1.3)	2 (100)	—
Nasopharynx	1 (0.6)	—	1 (100)
Tumor size			
<2 cm	10 (6.5)		
2–4 cm	44 (28.2)		
>4 cm	102 (65.3)		

Bartochowska et al. Brachytherapy. 2012 Mar-Apr;11(2):137-43

Table 2
Local control rates at 4 weeks, 3 months, and 6 months posttreatment

	Number (percentage) of patients, *n* (%)		
Result	Local control rate after 4 weeks	Local control rate after 3 months	Local control rate after 6 months
CR	26 (16.6)	26 (17.1)	27 (19.7)
PR	79 (50.5)	65 (41.5)	25 (18)
NR	16 (10.2)	13 (8.5)	0 (0)
Progression	34 (21.7)	34 (21.9)	47 (34.4)
Death	1 (1)	17 (11)	39 (27.9)

CR = complete remission; PR = partial remission; NR = nonremission.

Bartochowska et al.
Brachytherapy. 2012 Mar-Apr;11(2):137-43

Table 3
Local control rates 6 months posttreatment in different recurrent tumor localizations

Recurrent tumor localization	Number of patients	CR	PR	NR	Progression	Death
		Number (percentage) of patients, *n* (%)				
Cervical lymph nodes	72	17 (23.6)	20 (27.8)	—	10 (13.9)	25 (34.7)
Oropharynx	39	7 (17.9)	2 (5.1)	—	20 (51.3)	10 (25.7)
Tracheostomy region	20	1 (5)	3 (15)		12 (60)	4 (20)
Paranasal sinuses	4	—	—	—	4 (100)	—
Salivary glands	2	1 (50)	—	—	1 (50)	—
Nasopharynx	1	1 (100)	—	—	—	—

CR = complete remission; PR = partial remission; NR = nonremission.

Bartochowska et al.
Brachytherapy. 2012 Mar-Apr;11(2):137-43

HDR & PDR

Objective response 37.7%

OS @ 1y 40% and 2 y 17%

Complications - 35%.

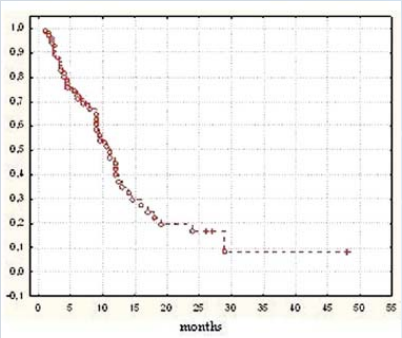


Fig. 2. Survival rate according to Kaplan–Meier method.

CONCLUSIONS:

- BCT is an alternative in the palliative treatment
- In special for ones not qualified and who rejected surgery.

Bartochowska et al.
Brachytherapy. 2012 Mar-Apr;11(2):137-43

THE Laryngoscope
FOUNDED IN 1896

Head and Neck

The role of high-dose-rate and pulsed-dose-rate brachytherapy in the management of recurrent or residual stomal tumor after total laryngectomy†

Residual Stomal Tumor after laryngectomy

16 patients - PDRBT & 5 patients HDR → 3 w/ CHT

Evaluation
@ 6 m - Obj response (Complete/partial remission) - 4 (20%)

OS @ 2 y actuarial - 22%.

Severe late complications 2 (9%)

Bartochowska et al
Laryngoscope. 2013 Mar;123(3):657-61

Response Rates

- local control @ 2y
  - 10%–50%.

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27

Kolotas et al.
Strahlenther Onkol. 2007 Feb;183(2):69-75

Bartochowska et al.
Brachytherapy. 2012 Mar;11(2):137-43

Bartochowska et al
Laryngoscope. 2013 Mar;123(3):657-61

Complications

- Possible complications
  - Bleeding
  - Mucosists
  - Ulceration
  - Extensive fibrosis (rare)
- Reduction of quality of life
  - tracheostomy

Pellizzon et al.
Radiat Oncol. 2006 Aug 8;1:27

Other Complications

- Wound complications
- Infections
- Skin reactions
- Seromas
- Catheter failures

Glatzel et al
Laryngoscope. 2002 Aug;112(8 Pt 1):1366-71.

Conclusions

- H&N tumor left untreated
  - poor prognosis
  - poor quality of life
  - median survival of only 5 months
- Curative therapeutic options are limited
- CHT* → widely used as alternative
  - response rate < 50%
  - median survival of 5–8 months

*Hehr et al.
IJROBP, 2005;61:1423–1431.

Final Thoughts

- In selected cases BT can be used as the last-line or palliative therapy
- And finally what about the economics?