Dose-volume effects in pathologic lymph nodes in cervical cancer

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BACKGROUND

- For locally-advanced cervical cancers, excellent local control rates with primary tumor dose ≥85Gy
- Nodal boost in node-positive disease
  - The dose threshold remains unclear.

PURPOSE

- To identify a treatment planning objective for pathologic nodes in cervical cancer
- To identify factors of nodal control
- To describe patterns of failure among node-positive cervical cancer patients

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METHODOLOGY

Case selection

- Retrospective (2002-2011)
- Node-positive, non-metastatic* cervical carcinoma
- Treated curatively with chemoradiation and image-guided adaptive brachytherapy (IGABT)
- No prior hysterectomy

Nodal staging

- Abdominopelvic CT and pelvic MRI
- PET-CT
- Para-aortic lymph node dissection (PALND)*

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METHODOLOGY

Treatment

- Chemoradiation : conformal, 45-46Gy with concurrent cisplatin
- PDR - IGABT : CTV_{HR} D_{90} ≥85Gy; CTV_{IR} D_{90} ≥60Gy using personalized vaginal molds
- ±Nodal boost : cumulative dose 60Gy, given sequentially or as simultaneous integrated boost

Prognostic factors for nodal control

- Nodal volume, dose, histology, concurrent chemotherapy, simultaneous boost
- Univariate analysis (log-rank tests), multivariate analysis (Cox proportional model; factors with p ≤0.10 in univariate)
- Probit analyses
- XLSTAT 2014

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RESULTS

Disease characteristics

Eligible cases, 108

T stage

- *T1b/T2a, 35%*
- ***T2b, 43%; T3b, 15%***

Tumor size

- *≤5cm 44%*
- *>5cm 56%*

Lymphadenopathies, 252:
(para-aortic, 19
pelvic, 233,
inguinal, 2)

- *Squamous cell carcinoma, 61%*
- *Grade 2-3, 59%*
- *Volume 3.4cm^3 ±5.8*
- *Cumulative EQD2 55.3Gy ±5.6*

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RESULTS

Treatment characteristics

Eligible cases, 108

Staging
- ***CT, 100%***
- ***MRI, 100%***
- *PET-CT, 94.4%*

Treatment
- *45.1 ±1.1Gy*
- *Conformal, 85%*
- *Chemotherapy, 96%*
- ***Intracavitary brachytherapy, 96%, interstitial, 4%***
- ***Nodal boost, 67% (sequential, 84%; simultaneous 16%)***

Lymphadenopathies, 254: (para-aortic, 19 pelvic, 233, inguinal, 2)

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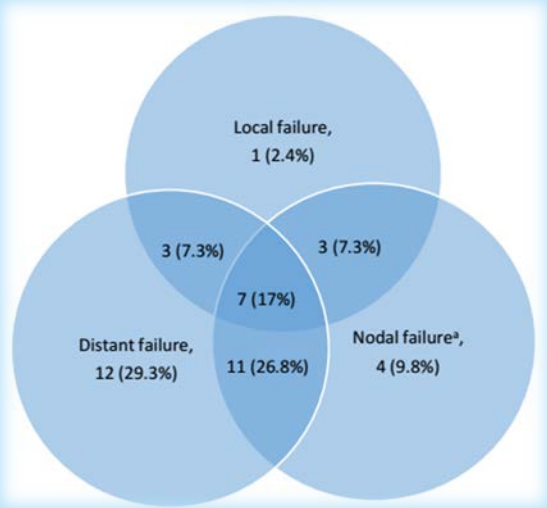
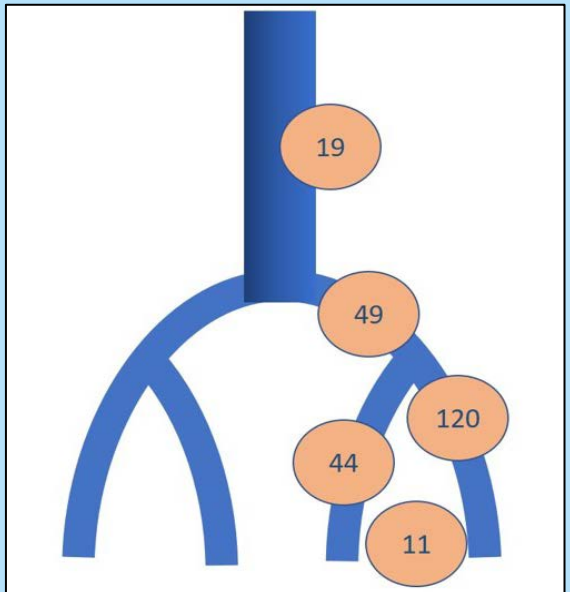
RESULTS

Patterns of failure (n=41)



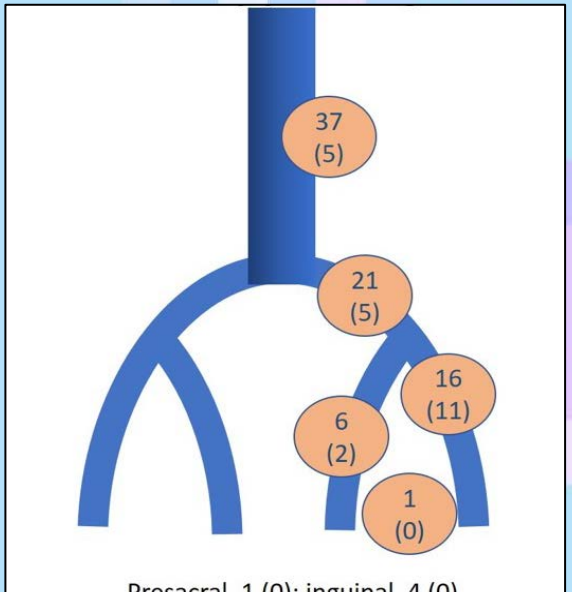
Median follow-up :
33.5 months (3-138 months)

Initially involved nodes, 254



Presacral, 4; parametrial, 3; perirectal, 2; inguinal, 2

Nodal failures, 86
(23 in initially pathologic nodes)



Presacral, 1 (0); inguinal, 4 (0)

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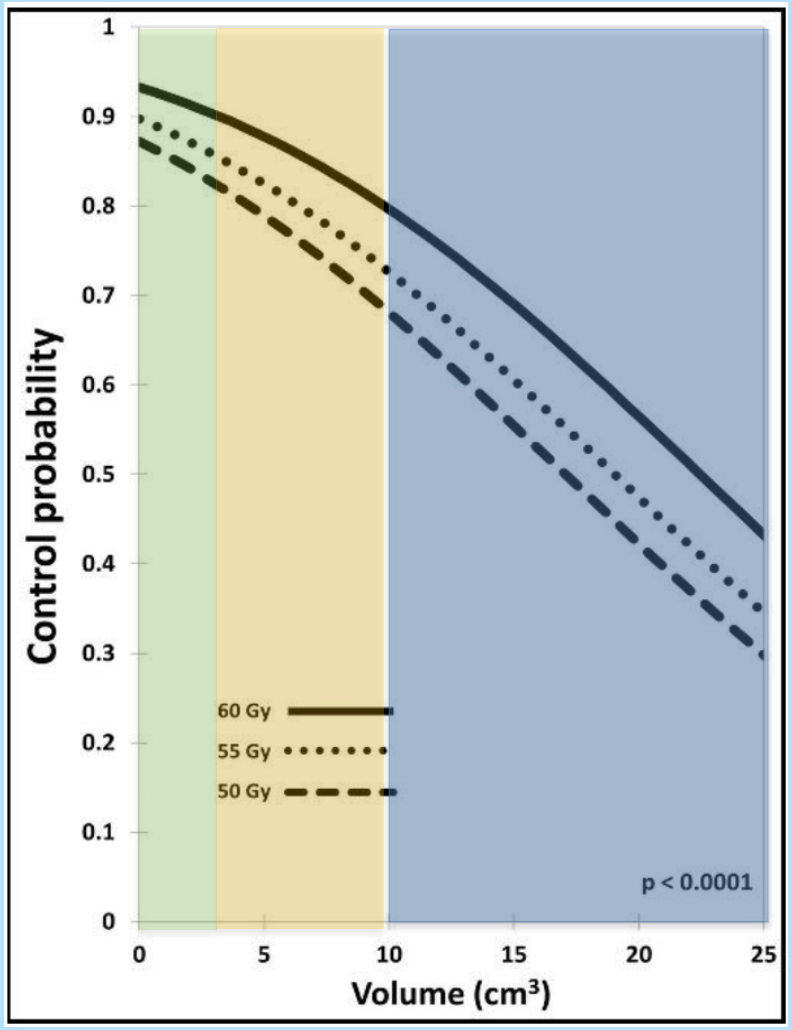
RESULTS

Prognostic factors for nodal control



- Univariate analysis
  - Volume (≥3 cm^3, p<0.0001)
  - EQD2 (≥57.5Gy, p=0.039)
  - SIB (p=0.07)
  - Histology (SCC versus others, p=0.35)
  - Chemotherapy (p=0.39)
- Multivariate analysis
  - Volume (HR=8.2, 4.0-16.6, p<0.0001)
  - EQD2 (HR=2, 1.05-3.9, p=0.034)

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CONCLUSION

- In node-positive disease, distant metastasis is the most common form of failure.
- Nodal failure, however, remains significant despite excellent local control.
  - Poorer control with nodal volumes ≥3cc
  - Better control with nodal EQD2 ≥57.5Gy
- A nodal dose-volume control relationship is demonstrated.

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