

Utilisation of a BioCon-700 bladder scanner to ascertain if the bladder filling protocol can be reduced from 500mls to 375mls for prostate patients undergoing radiotherapy



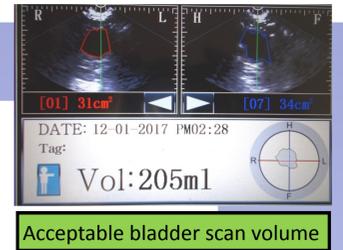
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Introduction

Current departmental protocol states patients must drink 500mls over 1 hour to ensure their bladder volume is within 200-400ml verified using an ultrasound bladder scanner^{1,2}. Due to acute side effects, patients struggle to maintain their original bladder volume and void on the couch, causing machine downtime and incurring costs of over £2000. This prompted an audit to investigate if the current bladder filling protocol could be reduced from 500mls to 375mls utilising the bladder scanner³.

Materials and Methods

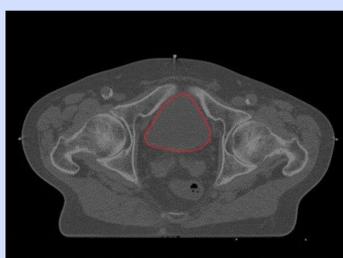
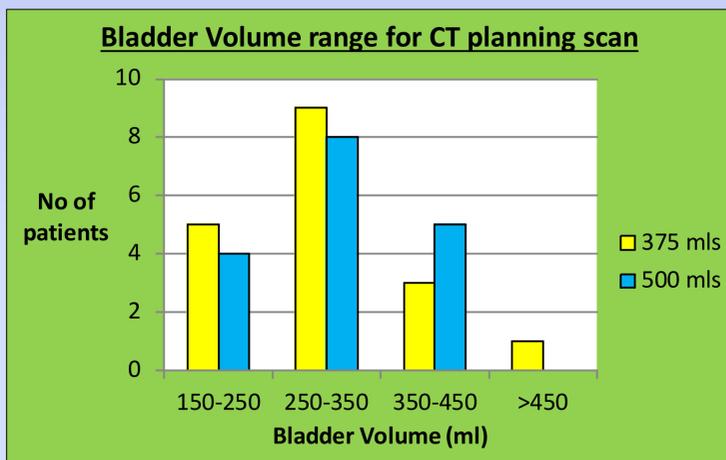
- 40 radical prostate cancer patients were selected at random:
 - Group A (20 patients):** Followed current 500mls bladder filling protocol (20 patients)
 - Group B (20 patients):** Followed experimental 375ml bladder filling protocol (20 patients)
- Bladder volume verification was completed prior to the pre-treatment CT scan for both groups.
- In order to compare the recorded bladder volume value with a cone beam computed tomography (CBCT) volume, 50% of the patients were treated on a CBCT capable linear accelerator



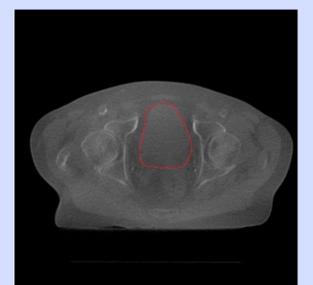
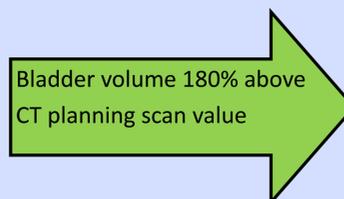
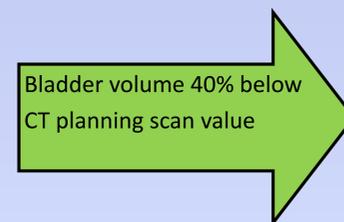
Results

- 1 patient omitted from audit as unable to bladder fill due to previous bladder surgery
- All patients successfully completed radiotherapy treatment
- The mean bladder volume for Group A – 291ml and Group B – 303ml, a t-Test was performed ($p=0.65$) showing no statistical significance.
- Review of CBCT images on bladder verification fractions confirmed it is safe to deliver radiotherapy with a 40-200% difference in bladder volume compared to pre-treatment (as shown below)

CBCT images illustrating minimum and maximum acceptable treatment bladder volumes



Bladder outlined on Pre-treatment CT scan



Bladder outlined on treatment CBCT scan

Conclusion

Utilisation of the ultrasound BioCon-700 bladder scanner has enabled the bladder filling volume to be reduced from 500ml to 375ml and increased the acceptable bladder volume range for treatment. Completing the audit has highlighted the importance of hydration prior to localisation and treatment for patients. Following the 375ml bladder filling protocol, patients are able to maintain an acceptable bladder volume throughout their treatment course without the need to void. Previous protocols required all prostate cancer patients to have a CT control scan for review of acceptable bladder and bowel volumes before their definite CT scan. The implementation of the bladder scanner has facilitated the omission of a CT control scan if bladder volume verification is unacceptable, increasing patient throughput and reducing the radiation dose delivered to the patient.

Future Department Developments

Review of CBCT images has highlighted how bladder filling affects PTV coverage for site specific cancers, therefore future projects include:

Audits of bladder filling protocol for:

- Prostate and nodes.
- Gynaecological Cervix, Endometrium, Vulva, Uterus.

References

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