Synchronous prostate cancer and rectal cancer - the impact of MRI on incidence and imaging findings

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Aims and objectives

Prostate cancer is the most common cancer in male and colorectal cancer the third most common cancer. Each year in Sweden approximately 10.000 males are diagnosed with prostate cancer and 2.000 individuals are diagnosed with rectal cancer, of those approximately 1.200 are men. [1].

Prostate cancer is usually diagnosed with transrectal ultrasound guided biopsies in patients with elevated prostate specific antigen (PSA). Magnetic resonance imaging (MRI) is used in a selected clinical situation to achieve a more accurate staging of the tumour, such as in patients with a negative biopsy and remaining clinical suspicion [2, 3] or for assessment of extracapsular extension (ECE) prior to radical surgery or radiation treatment [4-6].

High-resolution MRI plays on the other hand a pivotal role in the pre-treatment assessment in patients with primary rectal cancer and has become a routine pre-treatment investigation in these patients [7-9]. At our institution, MRI has been a standard pre-treatment work up for patients with rectal cancer since 1995 but was implemented around 2005 in general in Stockholm-Gotland's area.

When MRI is performed for primary rectal cancer, the prostate is included in the field of view and therefore can be viewed and evaluated. For this reason, the implementation of MRI in routine pre-treatment evaluation is likely to have resulted in a number of patients in whom prostate pathology is identified and in a proportion of those also synchronous prostate cancers.

The incidence, clinical presentation and radiological extent of synchronous rectal and prostate cancer in this setting are unknown. Limited published data is available on this subject and mostly consists of case reviews, but as far as we know none of them has a focus on MRI for the diagnosis [10-14].

The aim of this study is to assess the incidence of synchronous prostate cancer and rectal cancer as well as to identify how the patients were diagnosed, including the role of MRI when performed as a pre-treatment staging for rectal cancer.
Methods and materials

This study has the approval of the institutional review board and data was extracted from the Regional Rectal Cancer Registry and the Regional Cancer Registry for the Stockholm-Gotland area in Sweden. These databases were used to extract information from January 1, 1995 to December 31, 2011 on the presence of patients with histologically verified prostate and rectal cancer. Inclusion criteria were synchronous (simultaneously or within three months between the diagnosis) diagnosis of rectal cancer and prostate cancer where the rectal cancer was diagnosed prior to the prostate cancer.

Demographic data such as age at diagnosis was obtained and the clinical records were reviewed to identify patients presenting symptoms.

Most of the patients were examined with MRI of the pelvis as a pre-treatment staging for their rectal cancer and these examinations were retrospectively reviewed when available. The examinations included sagittal, transaxial and oblique T2-weighted images as well as transaxial T1-weighted sequences. If diffusion weighted images were available they were also evaluated but other pulse sequences used were excluded and not reviewed. Localization within the prostate (peripheral zone vs. transition zone), number of lesions and their size [15] as well as presence of ECE and seminal invasion according to previously establishes criteria were evaluated [4, 16, 17].

The prostatic lesions were further graded with a 5-point scale as recommended by the European Society of Urogenital Radiology (ESUR) guidelines [17, 18].
Results

Between the years 1995-2011 a total of 26,758 men with prostate cancer and 3,091 men with rectal cancer were diagnosed in the Stockholm-Gotland area.

A total of 29 patients (mean age 73.8 years; range 62-92) had a synchronous diagnosis. The annual distribution divided into 1995-1999, 2000-2005 and 2006-2011 showed a strong increase in the incidence of synchronous diagnosis. Between the years 1995-1999 there were two patients diagnosed, between the years 2000-2005, seven patients were diagnosed and 20 patients were diagnosed between the years 2006-2011. See fig 1.

The most common presenting symptom for rectal cancer during the study period was rectal bleeding, n=11. For the prostate cancer it was incidental finding during staging for rectal cancer, n= 20, and of those MRI led to the diagnosis in 14 cases.

At the retrospective review of the pelvic MR-images, all patients had focal lesions that indicated suspicion of prostate neoplasia, fig 2-4. Patients with higher grading of suspicion of malignancy on MRI also had more locally advanced disease than the lower graded lesions.
Fig. 1: The annual distribution of patients with synchronous diagnosis.

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**Fig. 2:** Transaxial T2-weighted images of the pelvis performed in a 62 year old male with rectal bleeding and polypoid rectal tumour detected by rectoscopy (same patient fig 2-4). The dorsal rectal tumour (arrow) without extensions into the perirectal fat (stage T2 tumour).

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Fig. 3: Same patient as in fig 2. On the MRI images, it is also apparent that the patient has a synchronous locally advanced prostatic tumour with signs of ECE (arrow).

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Fig. 4: Same patient as in fig 2 and 3. The locally advanced prostatic tumour with ECE (arrow fig. 3) including infiltration into the mesorectum and rectum (arrow). Both diagnosis were later histologically confirmed.

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Conclusion

There are very few published data on the incidence of synchronous disease available and the true incidence of synchronous diagnosis of rectal and prostate cancer is not known at present time.

Over the study period of 17 years there were only 29 patients (0.1%) with synchronous disease. Which are surprisingly few patients if we consider the total amount of 29,849 patients with the diagnosis of prostate or rectal cancer during the study period. However, there has been an accelerated increase in synchronous diagnosis, with 0.03% incidence of synchronous disease 1995-1999, 0.06% incidence of synchronous disease 2000-2005 and 0.2% incidence of synchronous disease 2006-2011. This substantial increase in the diagnosis of synchronous cancer during the last decade may partly be due to the increased clinical and radiological attention to evaluate the prostate.

The most common presenting symptom for the prostate cancer was found to be incidental finding at the pre-treatment staging for the rectal cancer where the MRI played a crucial role and led to the diagnosis in 14 patients. This suggests the important role of the radiologist in the diagnosing of synchronous disease and that synchronous diagnosis may further increase with increased use of MRI for routine work up.

It is of importance to diagnose an occult prostate cancer in patients with newly diagnosed rectal cancer even if there is little information on the clinical significance for this patient group. Following an abdominoperineal resection, a clinical rectal examination of the prostate cannot be done nor a transrectal ultrasound guided biopsies. If a patient has a suspected prostatic lesion or an elevated PSA level a perineal biopsy must then be performed instead of a transrectal biopsy, which is much less accurate [19, 20]. Furthermore, planning of surgery and neoadjuvant treatment for rectal cancer may be altered if the patient is diagnosed with synchronous prostate cancer.

In our study most of the lesions found on MRI were single focal prostatic lesions with locally advanced disease and high tumour grading which implies that if a focal lesion in the prostate is found it must be evaluated further. But these results must be interpreted with caution, because the patient selection in our study was done in such a way that we do not know the true number of prostatic lesions on the pre-treatment MRI in all patients with rectal cancer during the study period. Therefore the actual incidence of the synchronicity of these diseases is still unknown and it is impossible to calculate both the positive and negative predictive value.
Future possible research in this field would include the impact of synchronous diagnosis on patient management and outcome.

**In conclusion**, prostate and rectal cancer account for two of the most common cancer diagnoses in the male but synchronous diagnosis of the two diseases is a rare entity. A strong increase in the diagnosis of synchronous disease may be attributed to general awareness and better diagnostic methods including the use of pre-treatment MRI in the routine work up of rectal cancer.
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