NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Medical technology guidance

SCOPE

SpaceOAR hydrogel spacer for reducing rectal toxicity during radiotherapy for prostate cancer

1 Technology

1.1 Description of the technology

SpaceOAR (Boston Scientific) is an absorbable polyethylene glycol (PEG) hydrogel spacer that is injected into the perirectal space between the prostate and rectum before radiotherapy for prostate cancer. The technology is designed to temporarily position the rectum away from the prostate during radiotherapy and aims to reduce the risk of rectal toxicity by limiting the amount of radiation delivered to the rectum.

The SpaceOAR system is provided sterile and contains all components needed for the preparation of the spacer as well as a delivery system, in a single-use kit. Each kit contains the following components: PEG powder vial, diluent syringe, accelerator syringe, Y-connector, syringe holder, plunger cap and 18G x 15cm needle. The hydrogel precursor solution (made by mixing the PEG powder with the diluent solution) is injected into the perirectal space, along with the accelerator solution, where it polymerises to form a soft hydrogel within 10 seconds. The hydrogel remains in place and stable during the patient's radiation therapy (approximately 3 months), after which it breaks down slowly over several months, and is absorbed and cleared in the patients' urine.

SpaceOAR is inserted under local or general anaesthesia by a urologist, clinical oncologist, or radiologist and is usually done as an outpatient day case. The procedure also requires a side-fire transrectal ultrasound (TRUS)

probe for imaging guidance and a stepper used to stabilise the TRUS probe. The company also recommend using a stand-off balloon (an endocavity balloon that fits over the TRUS probe and is filled with water) to optimise ultrasonography imaging. Rectal preparation with an enema before the procedure may help to reduce imaging artefacts caused by faeces in the rectum. The procedure does not require the use of a urethral catheter. SpaceOAR has been selected by NHS England for the Innovation and Technology Payment (ITP) 2019/20 scheme.

1.2 Regulatory status

SpaceOAR hydrogel spacer was CE marked in March 2010 as a class III medical device.

1.3 Claimed benefits

The benefits to patients claimed by the company are:

- Reduction in rectal pain during radiotherapy
- Reduction in rectal toxicity (diarrhoea, frequent passing of stools, rectal bleeding)
- Reduction in urinary incontinence
- Better preservation of sexual function post radiotherapy compared with non-SpaceOAR patients
- Improved quality of life in bowel, sexual and urinary domains
- Fewer hospital/doctor visits due to reduced bowel, urinary and sexual complications
- Fewer therapeutic interventions to treat complications (sigmoidoscopy, argon plasma coagulation etc.)
- Additional rectal protection, to enable hypofractionated treatment regimens resulting in faster and more convenient treatment

The benefits to the healthcare system claimed by the company are:

- Reduced readmissions because of complications of radiation therapy

- Enabling therapy with hypofractionation regimens (reduced treatment time, fewer staff resources needed)

1.4 Relevant diseases and conditions

SpaceOAR is intended for use in patients receiving radiotherapy for localised prostate cancer to help minimise radiation exposure to the organs surrounding the prostate (organs at risk [OAR]), such as the rectum. SpaceOAR may also be suitable for some patients receiving radiotherapy for locally advanced prostate cancer.

Prostate cancer is the most common form of cancer among men in the UK, with approximately 400,000 men living with the disease (Prostate Cancer UK) and over 47,000 new cases diagnosed each year (Cancer Research UK, 2015). It is estimated that around 1 in 8 men in the UK will develop prostate cancer at some point in their life (Prostate Cancer UK).

Radiotherapy is a well-established and widely used curative treatment option for men with localised or locally advanced prostate cancer. Between 2013 and 2015, 30% of all men with newly diagnosed prostate cancer (within the last 12 months) received curative or palliative radiotherapy as part of their primary cancer treatment (Cancer Research UK, 2015). During the 2017/18 financial year, 13,936 men across England and Wales underwent radical radiotherapy for the treatment of prostate cancer (NPCA, 2018). Because of the proximity of the prostate to the rectum, radiotherapy for prostate cancer can cause rectal damage from inadvertent exposure to radiation. Symptoms include diarrhoea, incontinence, proctitis and ulceration of the rectal mucosa. They may occur early (within the first 3 months) or later and can range from mild transient changes in bowel habit, with no substantial impact on quality of life, to more serious complications that persist, and can lead to further treatment or surgery to improve bowel function. It is estimated that 1 in 10 men will experience a severe gastrointestinal complication within two years of treatment after external beam radiation (NPCA 2018). Results from UK-based studies (Dearnaley et al. 2016 and Dearnaley et al. 2007) show that 5-year incidences of bowel adverse events (Radiation Therapy Oncology Group

[RTOG] grade 2 or worse) ranged between 11% and 33% depending on the type of radiotherapy received. Higher doses of radiation therapy have been shown to improve prostate cancer control but, despite advances in radiotherapy techniques such as Intensity Modulated External Beam Radiotherapy (IMRT), the proximity of the rectum remains a limiting factor in the safe delivery of high-dose radiotherapy.

1.5 Current management

People with localised or locally advanced prostate cancer are typically offered a choice of treatment options depending on their cancer risk and personal preferences, including: 'watchful waiting', active surveillance, radiotherapy, radical proctectomy, androgen deprivation therapy and chemotherapy. Radiotherapy is an established curative treatment and can either be external-beam radiotherapy (EBRT) or brachytherapy. NICE's guidelines on the diagnosis and management of prostate cancer recommends offering hypofractionated radiotherapy (60 Gy in 20 fractions) using image-guided intensity modulated radiation therapy (IMRT) to people having radical external beam radiotherapy (EBRT) for localised prostate cancer, unless contraindicated. The use of hypofractionated radiotherapy (60 Gy in 20 fractions) has been commissioned by NHS England for a large subset of patients since October 2017. Conventional radiotherapy (74 Gy in 37 fractions) is recommended for people who cannot have hypofractionated radiotherapy. For people with intermediate- and high-risk localised prostate cancer, the guidelines recommend considering brachytherapy in combination with EBRT. The guideline also recommends offering a combination of radical radiotherapy and androgen deprivation therapy, rather than radical radiotherapy or androgen deprivation therapy alone, in these patients.

Recommendations made by the 2017 European guidelines on prostate cancer (EAU-ESTRO-ESUR-SIOG) are mainly in agreement with those made by NICE. The European guideline recommends that moderate hypofractionation with IMRT including image-guided radiation therapy (IGRT) to the prostate only can be offered to carefully selected patients with localised disease. It

should also adhere to radiotherapy-protocols from trials with equivalent outcome and toxicity, i.e. 60 Gy/20 fractions in four weeks or 70 Gy/28 fractions in six weeks.

Current management involves radiotherapy without spacer protection. NICE interventional procedures guidance on biodegradable spacer insertion to reduce rectal toxicity during radiotherapy for prostate cancer concluded that the current evidence on safety and efficacy is adequate to support the use of this procedure provided that standard arrangements are in place for clinical governance, consent and audit. The guidance also recommends that the procedure should only be done by clinicians with training in, and experience of, transperineal interventional procedures.

2 Statement of the decision problem

	Draft scope issued by NICE
Population	Patients receiving radical radiotherapy for localised or locally advanced prostate cancer
Intervention	Radical radiotherapy for localised or locally advanced disease with the addition of SpaceOAR hydrogel spacer
Comparator(s)	• Radical radiotherapy for localised or locally advanced disease with no spacer protection
Outcomes	The outcome measures to consider include: Procedural outcomes: • Mean prostate-rectal separation • Quality and symmetry of spacer placement • Hydrogel placement procedural success rate • Spacer stability over time • Treatment time and time to procedural proficiency • Use of prophylactic antibiotics, general anaesthesia, conscious sedation, or local anaesthesia • Number of hospital visits and procedures for SpaceOAR insertion compared with standard care Dosimetry outcomes: • Dose-volume histogram (DVH) metrics • Radiation dose to organs at risk (including rectum, other bowel, bladder and penile bulb) • Proportion of plans meeting rectal dose constraints Clinical management outcomes: • Treatment and/or number of hospital visits or admissions for bowel symptoms or endoscopic examinations • Staff resources to investigate and treat complications • Prostate cancer disease control (biochemical failure or differences in nadir PSA level after radiotherapy) Patient outcomes • Incidence of acute and late gastrointestinal and urinary toxicity (i.e. using Radiation Oncology Therapy Group [ROTG] radiation toxicity grading system) • Procedure-related adverse events and complications secondary to hydrogel insertion • Quality of life (i.e. using validated questionnaires such as Expanded Prostate Cancer Index Composite [EPIC]) • Incidence of symptoms of rectal toxicity

	• Patient comfort (including incidence of rectal pain) and experience • Incidence of urinary incontinence • Incidence of sexual dysfunction	
Cost analysis	Costs will be considered from an NHS and personal social services perspective. The time horizon for the cost analysis will be sufficiently long to reflect any differences in costs and consequences between the technologies being compared. Sensitivity analysis will be undertaken to address uncertainties in the model parameters, which will include scenarios in which different numbers and combinations of devices are needed.	
Subgroups to be considered	• People with low- or intermediate-risk prostate cancer (stages T1 and T2) • People with locally advanced prostate cancer • People with a history of inflammatory bowel disease (i.e. Crohn's disease, ulcerative colitis or severe colorectal diverticular disease) and those who have had previous colorectal surgery • Patients on long-term anticoagulation • Outcomes by type of radiotherapy received for example, IMRT, brachytherapy, IMRT in combination with brachytherapy, stereotactic ablative radiotherapy [SABR]; hypofractionated radiation [60 Gy in 20 fractions], conventional radiation [74 Gy in 37 fractions])	
Special considerations, including those related to equality	No device- or procedure-related equality issues were identified. People with cancer are protected under the Equality Act 2010, from the point of diagnosis. Older people and people of African-Caribbean and African family origin are at higher risk of developing prostate cancer. Transgender women may also remain at risk of developing prostate cancer. Age, race, sex and gender reassignment are all protected characteristics under the Equality Act 2010.	
	Are there any people with a protected characteristic for whom this device has a particularly disadvantageous impact or for whom this device will have a disproportionate impact on daily living, compared with people without that protected characteristics?	No
	Are there any changes that need to be considered in the scope to eliminate unlawful discrimination and to promote equality?	No
	Is there anything specific that needs to be done now to ensure MTAC will have relevant information to consider equality issues when developing guidance?	No

3 Related NICE recommendations and NICE pathways

Published

Clinical guidelines

- Prostate cancer: diagnosis and management. NICE clinical guideline NG131 (2019).

Technology appraisal guidance

- Padeliporfin for untreated localised prostate cancer. NICE technology appraisal guidance TA546 (2018)
- Radium-223 dichloride for treating hormone-relapsed prostate cancer with bone metastases. NICE technology appraisal guidance TA412 (2016)
- Degarelix for treating advanced hormone-dependent prostate cancer. NICE technology appraisal guidance TA404 (2016)
- Cabazitaxel for hormone-relapsed metastatic prostate cancer treated with docetaxel. NICE technology appraisal guidance TA391 (2016)
- Abiraterone for treating metastatic hormone-relapsed prostate cancer before chemotherapy is indicated. NICE technology appraisal guidance TA387 (2016)
- Enzalutamide for treating metastatic hormone-relapsed prostate cancer before chemotherapy is indicated. NICE technology appraisal guidance TA377 (2016)
- Enzalutamide for metastatic hormone-relapsed prostate cancer previously treated with a docetaxel-containing regimen. NICE technology appraisal guidance TA316 (2014)
- Abiraterone for castration-resistant metastatic prostate cancer previously treated with a docetaxel-containing regimen. NICE technology appraisal TA259 (2012)
- Docetaxel for the treatment of hormone-refractory metastatic prostate cancer. NICE technology appraisal TA101 (2006)

Interventional procedures guidance

- Biodegradable spacer insertion to reduce rectal toxicity during radiotherapy for prostate cancer. NICE interventional procedure guidance IPG590 (2017)
- Irreversible electroporation for treating prostate cancer. NICE interventional procedure guidance IPG572 (2016)
- Focal therapy using cryoablation for localised prostate cancer. NICE interventional procedure guidance IPG423 (2012)
- High dose rate brachytherapy in combination with external-beam radiotherapy for localised prostate cancer. NICE interventional procedure guidance IPG174 (2006)
- Cryotherapy as a primary treatment for prostate cancer. NICE interventional procedure guidance IPG145 (2005)
- Low dose rate brachytherapy for localised prostate cancer. NICE interventional procedure guidance IPG132 (2005)
- Cryotherapy for recurrent prostate cancer. NICE interventional procedure guidance IPG119 (2005)

High-intensity focused ultrasound for prostate cancer. NICE interventional procedure guidance IPG118 (2005)

Diagnostic guidance

- Diagnosing prostate cancer: PROGENSA PCA3 assay and Prostate Health Index. NICE diagnostics assessment guidance DG17 (2015).

Under development

NICE is developing the following guidance (details available from www.nice.org.uk):

- Abiraterone for the treatment of metastatic, castrate-resistant prostate cancer following previous cytotoxic chemotherapy. NICE technology appraisal guidance. Publication expected: TBC
- Abiraterone for treating newly diagnosed high risk metastatic hormone-naive prostate cancer. NICE technology appraisal guidance. Publication expected: TBC
- Apalutamide for treating metastatic hormone-sensitive prostate cancer. NICE technology appraisal guidance. Publication expected: TBC
- Apalutamide for treating non-metastatic, hormone-relapsed prostate cancer. NICE technology appraisal guidance. Publication expected: TBC
- Bone metastases (hormone refractory prostate cancer) – denosumab. NICE technology appraisal guidance. Publication expected: TBC
- Enzalutamide for the treatment of hormone refractory prostate cancer. NICE technology appraisal guidance. Publication expected: TBC
- Enzalutamide for treating non-metastatic hormone-relapsed prostate cancer. NICE technology appraisal guidance. Publication expected May 2019
- Prostate cancer (hormone refractory) – atrasentan. NICE technology appraisal guidance. Publication expected: TBC
- Prostate cancer (prevention) – dutasteride. NICE technology appraisal guidance. Publication expected: TBC

4 External organisations

4.1 Professional organisations

The following societies have been alerted to the availability of the draft scope for comment:

- Prostate Cancer Advisory Group
- British Uro-Oncology Group (BUG)
- British Urology Foundation
- British Association of Urological Surgeons (BAUS)
- British Society of Interventional Radiology

- Royal College of Radiologists
- British Institute of Radiology
- British Association of Day Surgery
- British Association of Urological Nurses

4.2 Patient organisations

The following organisations have been alerted to the availability of the draft scope for comment:

- Pelican Cancer Foundation
- Bob Champion Cancer Trust
- Orchid - Fighting Male Cancer
- Prostate Cancer UK (formerly prostate cancer charity)
- Prostate Help Association (PHA)
- Tackle Prostate Cancer
- Prostate Cancer Support Scotland
- Men's Health Forum (MHF)
- Bladder and Bowel UK

