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Beyond technique: Towards zero-incontinence in robotic assisted radical prostatectomy through purposeful practice

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ABSTRACT

In this case series including ten consecutive patients, we present results of our robotic radical prostatectomy improvement process. We introduced purposeful practice and we have implemented a specifically designed and built digital platform (Healthium®) with the goal of eliminating urinary incontinence after robotic radical prostatectomy. Patient reported outcomes (PROMs) at three months showed zero-incontinence. Nine out of ten patients did not require any incontinence pads, one patient was still using one small pad as he was very physically active but scored 0 on question five on the ICIQ-SF, which assesses how much incontinence interferes with quality of life (scale for question five from 0 to 10). Importantly, 20% of this cohort had urinary incontinence pre-operatively with ICIQ-SF scores of nine and 11 and one to two incontinence pads/24h respectively. The use of the Healthium® platform made the recording of the peri-operative and intraoperative variables simplistic and efficient, patient information and consenting more personalised, and facilitated data extraction and analysis; subsequently facilitating patient improvements based on surgeon's own data.

KEYWORDS

Digital health; Incontinence; Prostate cancer; Purposeful practice; Robotic assisted radical prostatectomy

1. CASE SERIES

Urinary Incontinence (UI) after radical prostatectomy (RP) is a well-documented complication [1]. A prospective controlled non-RCT of patients undergoing RP in 14 centres using Robotic assisted RP or open RP showed that, 21.3% of patients were incontinent 12 months after Robotic assisted RP, as were 20.2% after open [1]. Inspired by purposeful practice principles we have started a program of incremental peri and intraoperative improvements to assess the possibility to achieving zero incontinence at three months post robotic RP. We have designed and developed a digital platform for patient perioperative pre- and post-habilitation and also to allow collection of Patient Reported Outcomes Measure (Healthium® - Fig. 1). It incorporates software robotics and uses different intraoperative and pre-operative variables to analyse the correlations with UI and other postoperative outcomes.

We define zero-incontinence when: (number of postoperative pads - number of pre-operative pads)/24h * ICIQ-SF Q5 is 0 (the product between the difference between the number of incontinence pads per 24 hours before and after surgery and the value of the answer at question five from the ICIQ-SF score was 0).

We commenced patient recruitment to the platform in June 2023. All patients were from one NHS trust and enrolled as part of the prostate cancer digital pathway transformation. Patients' data was acquired and used in line with the Information and clinical governance framework.

We present the results of the first ten patients enrolled on the digital platform. All patients had transperineal biopsies 24 cores (Fig. 2). All patients benefited from pre-operative counselling and referral to physiotherapy for pelvic floor exercise. They were also offered access to a dedicated mobile application with information based on lifestyle medicine and aimed at pre-habilitation and rehabilitation including pelvic floor exercise routines.

Figure 1. Healthium® digital platform – patients app

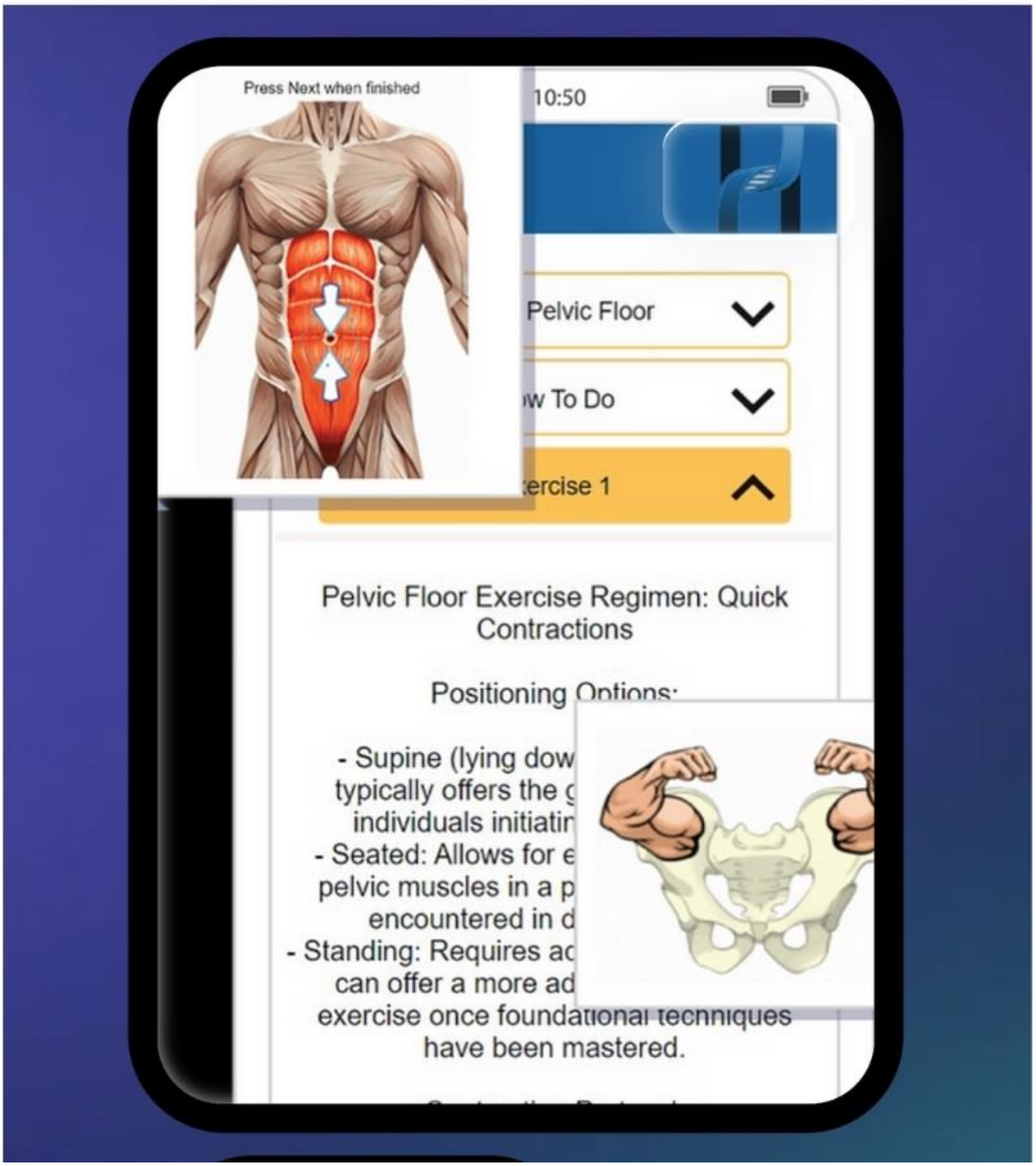
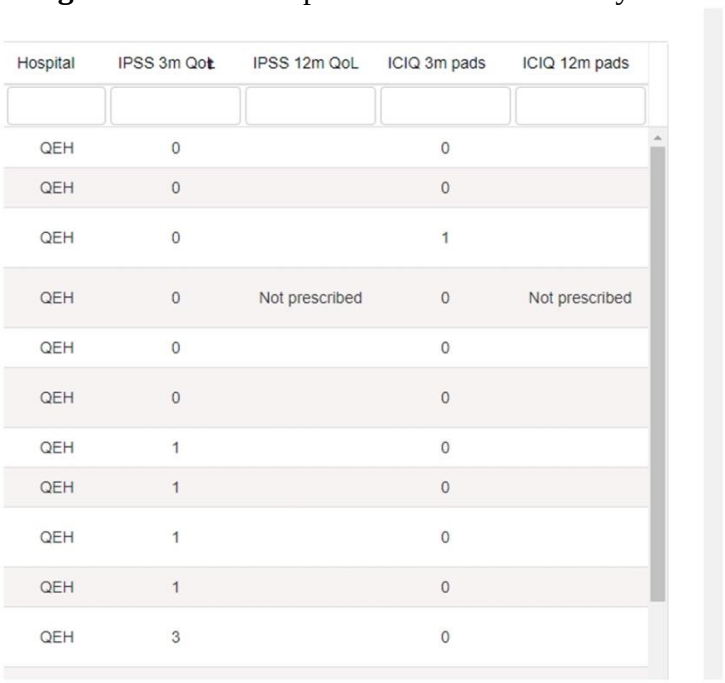


Figure 2. Healthium platform results summary



Hospital	IPSS 3m QoL	IPSS 12m QoL	ICIQ 3m pads	ICIQ 12m pads
QEH	0		0	
QEH	0		0	
QEH	0		1	
QEH	0	Not prescribed	0	Not prescribed
QEH	0		0	
QEH	0		0	
QEH	1		0	
QEH	1		0	
QEH	1		0	
QEH	1		0	
QEH	3		0	

2. SURGICAL TECHNIQUE

We have used software robotics to generate the operative notes and to collect information about the variables during the procedure. The surgical approach was robotic anterior. We have incorporated a series of incremental improvements, for example:

1. Bladder neck sparing: We have performed limited bladder neck sparing only when the tumour was not involving the base of the prostate as we wanted to avoid the increased risk of positive margins.
2. We have performed in all the cases posterior reconstruction.
3. The decision to perform nerve sparing was based on the location of tumours, nomograms and MR reports.
4. Urethral length was preserved.
5. Anterior reconstruction was performed in all cases. The hood technique [2] was performed based on a combination of tumour visualisation on MR and results of the prostate biopsies - if there was no tumour in the anterior part of the prostate.

The surgical technique was the one usually performed by the surgeon. The cases were performed in a teaching hospital and involved parts of the procedures performed by trainees.

3. RESULTS

Zero-incontinence as per our definition, was achieved in 100% of the cases at three months follow-up as per patient reported outcome measures. 90% of the patients were incontinence pad free Fig 3. One patient had one incontinence pad as he was very physically active, but according to question five of the ICIQ-SF his score was 0 (zero interference of any UI with his Quality of life (QoL)) Fig 4.

To further assess patients' satisfaction with their urinary symptoms we asked the QoL question from the International Prostate Symptom Score questionnaire.

Figure 3. Number of incontinence pads at 3 months postoperatively

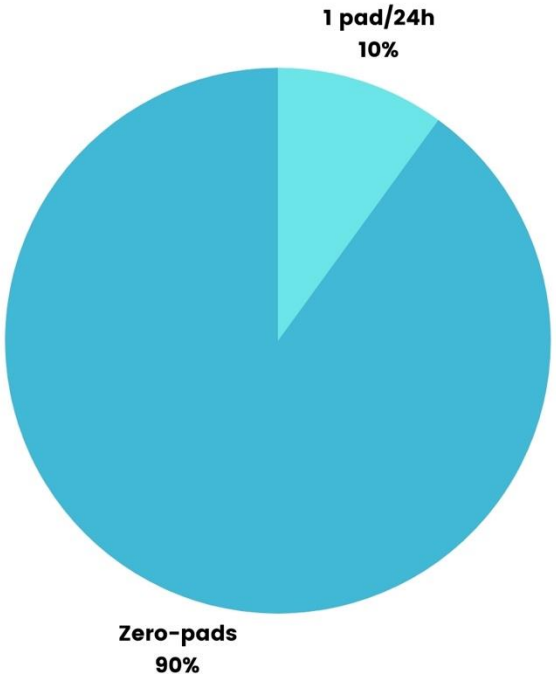
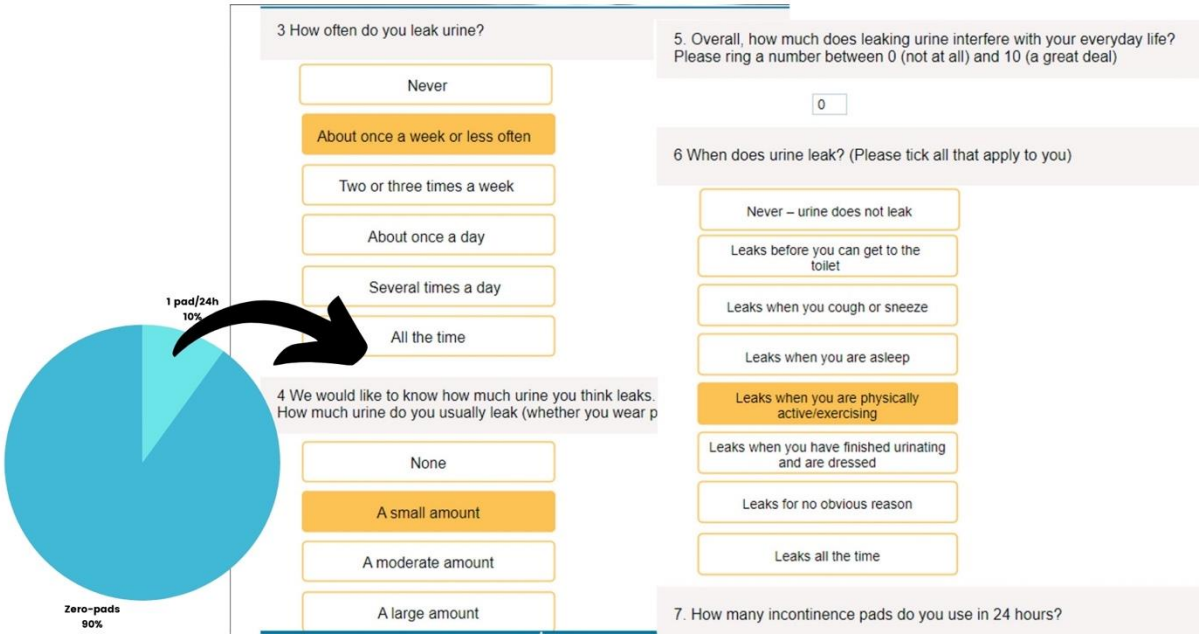


Figure 4. ICIQ-SF result



The age of the patients varied from 53 to 74 years, two patients being over the age of 70 years. PSA varied between 3.47 ng/ml and 11.3 ng /ml. Gleason score was 3+4=7 in 5 patients, 4+3=7 in three patients and 4+5=9 in two patients. 30% of the cases were pT3a and the rest pT2. Body mass index (BMI) was between 24.4 and 34.5 with an average of 28.36 (overweight). 30% of the patients were obese.

The postoperative PSA was undetectable at seven weeks postoperatively in all but one patient. This 71 years old patient with a PSA of 8 ng/ml preoperatively and BMI 34.5, had high risk disease (Gleason 4+5=9). Postoperative PSA 0.3 ng/ml triggered a PSMA PET which identified lymph nodes disease at the level of pre-sacral, mesorectal nodes and paraaortic nodes.

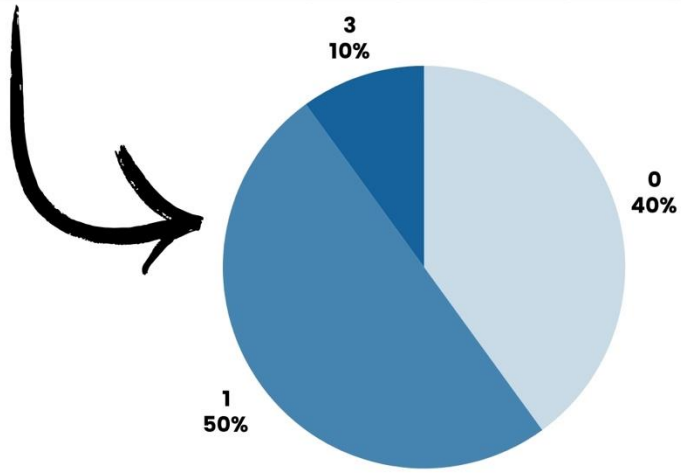
The surgical technique involved in three patients was unilateral nerve sparing, one no-nerve sparing (the 71 years old patient presented above) and six various degrees of bilateral nerve sparing. Bladder neck sparring was possible in six patients.

IPSS score pre-operative was available for six patients with a mean score preoperatively at 8.5 and postoperatively 6.3. For the QoL of IPSS score, the mean pre-operative value was 2.17 and postoperative 0.83.

The IPSS QoL question score was 0 (delighted) in four patients, 1 (pleased) in five patients and 3 (mixed) for one patient Fig. 5. This latter patient described more than 4 units of alcohol intake daily and a large number of caffeinated drinks (> 5 mugs/day).

Figure 5. IPSS QoL answers

Quality of life due to urinary symptoms	Delighted	Pleased	Mostly satisfied	Mixed: Equally satisfied / dissatisfied	Mostly dissatisfied	Unhappy	Terrible
If you were to spend the rest of your life with your urinary condition the way it is now, how would you feel about that?	0	1	2	3	4	5	6



The total ICIQ-SF score, postoperatively varied from 0 to 6 (average 2.1). It is important to highlight two cases. One, had a preoperative score of 9 and was wearing one incontinence pad, postoperatively the ICIQ-SF score was 0 and the patient did not need any incontinence pads. The second patient had a pre-operative ICIQ-SF score of 11 and needed two incontinence pads per day. Postoperatively the score was 0 and no incontinence pads were needed.

4. DISCUSSION

We believe that this represents an example of purposeful practice for improving surgical results. We believe urinary continence is very important for the patients QoL and this has been consistently shown in clinical trials including meta-analysis [4]. The systematic review and meta-analysis on UI and QoL published by Pizzol et al., has described that UI was associated with lower levels of physical activity ($p < 0.0001$), poor mental health ($p< 0.0001$) and lower QoL in general ($p <0.0001$) [4].

The Protect clinical trial has shown that 15-year prostate cancer specific mortality was low (2.2% in the prostatectomy group, 3.1% in the active monitoring group) regardless of the treatment option [5]. The authors reported that according to the contemporary D'Amico criteria, risk-stratification tools revealed that 369 men (24.1%) had intermediate disease and 147 (9.6%) had high-risk disease, making the results relevant for the RP cohort of patients. They also report that "No differential effects on cancer-specific mortality were noted in relation to the baseline PSA level, tumour stage or grade, or risk-stratification score [5].

In this cohort of patients, approximately 55% reported the need for one or more incontinence pads at six months [6]. Considering the 15-year prostate cancer specific survival of the postprostatectomy patients as well as the very important impact the incontinence has on the QoL of the cancer survivors, we believe that preserving urinary continence is of significant importance. This was the rationale of this improvement process. The patients receive their own mobile application to guide them through the perioperative period and collect the information regarding the IPSS, ICIQ-SF, SHIM scores and the compliance with the recommended lifestyle changes.

For the patients that did not want to use the digital platform on their mobiles, we have collected the data by providing the patients with an iPad immediately before or after the clinical appointment. This combination has proved successful in all the cases.

Considering the impact of incontinence on QoL we believe the results are significant. The patients had an anterior approach procedure that facilitates the dissemination of the technical modifications. The use of digital technology makes the dissemination of this improvement process easy to transfer to other hospitals. We acknowledge that larger number of patients would need to be included in following analysis.

5. CONCLUSIONS

We describe patient reported outcome measures of zero-incontinence at three months follow-up in a cases series of ten consecutive patients who have followed the prostate cancer digital pathway (Healthium®) and had RP.

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AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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