Feasibility of in-office MRI-targeted partial gland cryoablation for prostate cancer: an IDEAL stage 2A study

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ABSTRACT

Objectives Cryoablation for prostate cancer is typically performed under general anaesthesia. We explore the safety, feasibility and costs of in-office MRI-targeted partial prostate gland cryoablation (PGC) under local anaesthesia. We hypothesise that an office-based procedure under local anaesthesia may yield greater patient convenience and lower health costs with similar outcomes to a general anaesthesia approach.

Design/participants/setting/interventions Retrospective study of men diagnosed with clinically significant prostate cancer (grade group (GG) ≥2) who elected to undergo in-office PGC under local anaesthesia.

Main outcome measures A total of 55 men with GG ≥2 prostate cancer underwent PGC under local anaesthesia, and 35 of 43 men (81.4%) who attained ≥6 months of follow-up treatment under MRI-targeted surveillance biopsy. We used MRI findings and targeted biopsy to characterise post-PGC oncological outcomes. Complications were categorised using Common Terminology Criteria for Adverse Events (CTCAE). Expanded Prostate Cancer Index-Clinical Practice was used to characterise urinary and sexual function scores at baseline, 4 and 9 months post-PGC. Time-driven activity-based costing was used to determine healthcare costs of in-office PGC.

Results Five (9.1%) men experienced CTCAE score 3 adverse events. Urinary and sexual function did not change significantly from baseline to 4 months (p=0.20 and p=0.08, respectively) and 9 months (p=0.23 and p=0.67, respectively). Twenty-two men (62.9%) had cancer or GG1 and 13 (37.1%) men had GG≥2 on post-PGC biopsy. Moreover, the median cost of in-office PGC was US$4,463.05 (range US$4,087.19–US7,238.16) with disposables comprising 69% of the cost.

Conclusions In-office PGC is feasible under local anaesthesia with favourable functional outcome preservation and adverse events profile at significantly lower costs compared with similar outcomes to a general anaesthesia approach.

INTRODUCTION

The aim of partial gland ablation for prostate cancer is to eliminate cancer while sparing noncancerous prostate tissue to preserve urinary, sexual and ejaculatory function.1 Interest in prostate gland ablation has grown in the USA due to the recent Food and Drug Administration approval of high-intensity focused ultrasound (HIFU) for prostate tissue ablation and increased use of MRI-ultrasound fusion targeted (MRI-targeted) prostate biopsy, which improves tumour localisation relative to conventional transrectal ultrasound-guided prostate biopsy.1 2 Various thermal energies such as cryoablation, HIFU, laser ablation and short electric pulses have

What is already known about this subject?

► Partial gland cryoablation (PGC) is an ablation approach that has been described for prostate cancer focal therapy. It has emerged as an attractive treatment option as it offers minimally invasive cancer treatment with preservation of functional outcomes. Historically, PGC has been performed at ambulatory centres and under general anaesthesia.

What are the new findings?

► This is the first series of in-office PGC performed under local anaesthesia. We demonstrate that in-office PGC is feasible, well tolerated and has favourable functional outcomes with no significant change in pretreatment versus post-treatment urinary and sexual function. Furthermore, in-office PGC has oncological outcomes comparable to high-intensity focused ultrasound and PGC under general anaesthesia at a significantly lower cost.

How might these results affect future research or surgical practice?

► We demonstrate that in-office PGC is a promising and cost-effective approach with similar outcomes to ablation under general anaesthesia. Our approach may allow urologists to offer an office-based prostate cancer treatment procedure at a better cost and comparable outcomes to procedures under general anaesthesia. Nevertheless, more studies assessing long-term outcomes are needed before widespread dissemination.
have been used for partial gland ablation\(^3\); however, there is a
dearth of comparative outcomes and cost research.

The current post-treatment paradigm of partial gland
ablation entails follow-up with active surveillance (pro-
state specific antigen (PSA), MRI, biopsy). Longitudinal
costs of active surveillance have been shown to be more
than radical prostatectomy, particularly for younger men
with long life expectancy.\(^3\) Cryoablation has traditionally
been a whole prostate gland treatment under general
anaesthesia and is less costly compared with HIFU.\(^3\)
The ability to perform an office-based procedure would
further attenuate expenses from ambulatory surgery
centre and general anaesthesia costs while improving
patient convenience. In this pilot study, we present our
initial experience with in-office, MRI-targeted partial
gland cryoablation (PGC) under local anaesthesia.

MATERIALS AND METHODS
Study population
This study included 55 men diagnosed with clinically
significant prostate cancer (grade group (GG) ≥2) using
targeted biopsy with systematic biopsy at Urological
Research Network (n=5; Florida, USA) and NewYork-
Presbyterian/Weill Cornell Medicine (n=50; New York,
USA). Men were enrolled in clinical trials for PGC (NCT
02381990 and NCT 03492424, respectively). Men were
counselled that there was a dearth of long-term cancer
control outcomes and comparative studies between PGC
and whole gland treatment. Additionally, men were
counselled regarding conventional treatment options
(surveillance, surgery, radiation). All prostate MRIs were
reviewed by an experienced uroradiologist (DJM) to plan
PGC, using the Prostate Imaging-Reporting and Data
System (PI-RADS) V2 recommendations. Lesions were
graded accordingly\(^6\); none had gross evidence of extra-
prostatic extension or seminal vesicle invasion. The trial
flow is demonstrated in figure 1.

Partial gland cryoablation
An oral antibiotic (fluoroquinolone or trimethoprim/
sulfamethoxazole) was given the morning of PGC and
the procedures were conducted in the office setting. Only
four men (7.3%) asked for a short-acting oral benzodi-
azepine and none required intravenous access. The
perineum was shaved and prepped with betadine in the
lithotomy position and a Foley catheter was inserted. The
skin, subcutaneous tissue and periprostatic nerves were
blocked with 20 mL of 1% lidocaine. A biplane ultrasound
Noblus probe (Hitachi Aloka, Twinsburg, Ohio, USA) was
inserted transrectally. All procedures were performed by
two surgeons (JCH and FJB) using the Artemis platform
(Eigen, Grass Valley, California, USA). The contoured
prostate along with MRI planned ablation zone(s) were

Figure 1  In-office prostate PGC under local anaesthesia trial flow. GG, grade group; PGC, partial gland cryoablation.
coregistered to ultrasound. A minimum of two cryotherapy probes were transperineally inserted using MRI targeting. The total number of probes used was dependent on the size of the lesion and was at the discretion of the treating surgeon. Men without MRI-visible disease underwent quadrant PGC. Two freeze thaw cycles to negative 40°C were performed to ensure tumour lysis; safety of the procedures was enhanced by real-time image fusion monitoring where the ice-ball would cover the target area within the MRI prostate contour. The targeted ablation zone that extended 1.5 cm beyond the border of the region of interest or reached the boundary of the prostate. Men were discharged home with an indwelling Foley catheter unless they had low volume tumours without definitive urethral ice-ball impingement.

**Follow-up, quality of life and adverse events**

Men followed up for catheter removal within 7 days and PSA 3 months after PGC. Complications were captured by research coordinators uninvolved with clinical care and classified outcomes using the National Cancer Institute Common Terminology Criteria for Adverse Events (CTCAE) V.5.0.9 Urinary and sexual function were assessed using the Expanded Prostate Cancer Index for Clinical Practice (EPIC-CP), with lower scores indicating better outcomes, at baseline, at 4 months and 9 months post-PGC. A total of 35 men (63.6%) attained 6-month follow-up. All men underwent post-PGC MRI-targeted and systematic surveillance biopsy at this time. Four men had insurance denial of the MRI and, thus, underwent MRI-targeted biopsy using the pretreatment MRI. Failure of in-office PGC was defined as the detection of clinically significant prostate cancer (GG≥2) on the 6-month post-PGC biopsy.

**Time-driven activity-based costing**

Time-driven activity-based costing (TDABC) is a described strategy to calculate the true cost of healthcare services. Therefore, it was used to determine the costs of performing in-office, MRI-targeted PGC under local anaesthesia. A process flow map and detailed calculations of every step was performed by one of the authors (AL). Procedure flow times (the time from Foley catheter insertion to PCG completion) were recorded in the medical record. Personnel, equipment and material costs were all factored in to derive capacity cost rates, which also incorporated indirect costs such as depreciation and employee benefits. These capacity cost rates were then multiplied by the relevant process times, and TDABC was defined as the sum of its resources. We then determined the median cost of in-office PGC for all procedures and compared these costs to PGC under general anaesthesia and HIFU partial gland ablation as previously reported, excluding the follow-up costs. We compared the cost of in-office PGC under local anaesthesia to PGC under general anaesthesia performed at an ambulatory surgery centre based on resource utilisation, process maps and times for five cases before this series. Furthermore, we compared the in-office PGC to HIFU, because the latter is currently an alternative modality for partial gland ablation in the USA.3,11

**RESULTS**

**Patient characteristics**

Median age was 70 years (IQR 63.4–75), median pretreatment PSA was 6.6 ng/mL (IQR 7.7–9.2) and median prostate volume was 39 cc (IQR 31.5–54.5) (table 1, figure 2). Forty-two men (83%) had PI-RADS category ≥4 lesions. Thirty-two (58.2%) men had GG 2, 13 (23.6%) had GG 3, 7 (12.7%) had GG 4 and three (5.5%) had GG 5 on pretreatment biopsy (table 1, figure 2). Two cryoablation probes were used in 38 (69%) men, three probes in 7 (12%) men and 4–6 probes were used for the other subjects. Four men were discharged from clinic without an indwelling catheter because the treatment area was deemed small and away from the urethra.

**Post-treatment outcomes**

We observed a 65% median PSA decline, although a quarter of patients had greater than a 94% decrease. The median duration of urethral catheterisation was 6 days (IQR 3–7). The prostate volume decreased by 18.3% on post-treatment MRI. On post-PGC MRI, almost half of the patients had GG2, 1 (2.9%) had GG3 and another (2.9%) had GG4 (table 2, figure 2). Out of the 13 (37%) men that had recurrence (GG≥2), 7 (54%) were found to have in-field while 6 (46%) had out-of-field recurrences (figure 3A).

Twenty-four (68.6%) men were opted for active surveillance after PGC (two with GG2 and seven with GG1).

**Table 1** Baseline characteristics

<table>
<thead>
<tr>
<th>Age (years), median (IQR)</th>
<th>70 (63.43–74.96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSA (ng/mL), median (IQR)</td>
<td>6.6 (4.73–9.18)</td>
</tr>
<tr>
<td>MRI findings</td>
<td></td>
</tr>
<tr>
<td>Volume (mL), median (IQR)</td>
<td>39 (31.50–54.45)</td>
</tr>
<tr>
<td>Max PI-RADS V.2, n (%)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9 (17.65)</td>
</tr>
<tr>
<td>4</td>
<td>28 (54.90)</td>
</tr>
<tr>
<td>5</td>
<td>14 (27.45)</td>
</tr>
<tr>
<td>Biopsy of target (max GG), n (%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>32 (58.18)</td>
</tr>
<tr>
<td>3</td>
<td>13 (23.64)</td>
</tr>
<tr>
<td>4</td>
<td>7 (12.73)</td>
</tr>
<tr>
<td>5</td>
<td>3 (5.45)</td>
</tr>
</tbody>
</table>

Prostate volume was obtained from prostate MRI.

GG, grade group; PI-RADS V.2, Prostate Imaging-Reporting and Data System V.2; PSA, prostate specific antigen.
The rest of the men with GG2 or above on surveillance biopsy underwent repeat PGC (n=5), radical prostatectomy (n=3) or radiation therapy (n=3) (figure 3B). The men who underwent salvage radical prostatectomy had no postoperative complications. Two men had GG2 on both biopsy and prostatectomy specimens while the other man was downgraded from GG4 on biopsy to GG3 at prostatectomy.

There were no significant changes in mean EPIC-CP urinary and sexual function scores from baseline to 4 months (0.71 vs 1.17, p=0.20 and 3.41 vs 4.84, p=0.08, respectively) and from baseline to 9 months (0.71 vs 1.21, p=0.23 and 3.41 vs 3.83, p=0.67, respectively) post-PGC (table 3). No man experienced urinary incontinence.

All men completed the procedure successfully. Thirteen men (24%) experienced an adverse event (table 4). In total, there were 22 (40%) CTCAE V.5 score 2 and 5 (9.1%) score 3 events within the first 30 days, although no reported sequelae occurred beyond this interim. There were no severe adverse events (CTCAE grade >3).

**Total costs**

TDABC assessment demonstrated the median cost of in-office PGC under local anaesthesia was US$4,463.05 (range US$4,087.19–US$7,238.16) with the majority of costs consisting of cryotherapy disposables (US$3,086.45). Overhead, depreciation and the remaining fixed indirect costs of the procedure, Artemis device and MRI itself remained a substantial cost driver, totalling US$1,376.61. In-office PGC has an approximately sixfold lower fixed cost compared with PGC under general anaesthesia, which contributes to an overall lower cost. Moreover, HIFU under general anaesthesia was almost twice as costly at US$8,449.11 compared with in-office PGC. The higher costs of ASC PGC and HIFU are fueled by the need to be done under general anaesthesia and longer operative times (median length of procedure for in-office PGC 28 (range 16–58 min) minutes vs 120 min (range 90–150 min) for ASC PGC and HIFU) (table 5).

**DISCUSSION**

Advances in prostate MRI and targeted biopsy has piqued interest in prostate gland partial ablation.1 2 Additionally, partial gland ablation offers the potential to avoid adverse

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**Table 2** Postpartial gland cryoablation outcomes

<table>
<thead>
<tr>
<th>Measure</th>
<th>Median (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheter duration (days)</td>
<td>6 (3–7)</td>
</tr>
<tr>
<td>PSA decrease from baseline (ng/ml), median (IQR)</td>
<td>4.3 (2–6.2)</td>
</tr>
<tr>
<td>MRI findings</td>
<td></td>
</tr>
<tr>
<td>% decrease in prostate volume from baseline, median (IQR)</td>
<td>18.3 (0–28.0)</td>
</tr>
<tr>
<td>Max PI-RADS V.2, n (%)</td>
<td></td>
</tr>
<tr>
<td>No lesions/not identified</td>
<td>15 (48.40)</td>
</tr>
<tr>
<td>2</td>
<td>2 (6.45)</td>
</tr>
<tr>
<td>3</td>
<td>5 (16.13)</td>
</tr>
<tr>
<td>4</td>
<td>7 (22.57)</td>
</tr>
<tr>
<td>5</td>
<td>2 (6.45)</td>
</tr>
<tr>
<td>Post-treatment targeted biopsy (max GG), n (%)</td>
<td></td>
</tr>
<tr>
<td>Benign</td>
<td>15 (42.86)</td>
</tr>
<tr>
<td>1</td>
<td>7 (20.0)</td>
</tr>
<tr>
<td>2</td>
<td>11 (31.43)</td>
</tr>
<tr>
<td>3</td>
<td>1 (2.86)</td>
</tr>
<tr>
<td>4</td>
<td>1 (2.86)</td>
</tr>
<tr>
<td>Recurrence, n (%)</td>
<td></td>
</tr>
<tr>
<td>In-field</td>
<td>7 (20.00)</td>
</tr>
<tr>
<td>Out-of-field</td>
<td>6 (17.14)</td>
</tr>
<tr>
<td>Ablated site</td>
<td>10 (28.57)</td>
</tr>
<tr>
<td>Non-ablated site</td>
<td>3 (8.57)</td>
</tr>
<tr>
<td>Post-treatment plan, n (%)</td>
<td></td>
</tr>
<tr>
<td>Active surveillance</td>
<td>24 (68.57)</td>
</tr>
<tr>
<td>Repeat PGC</td>
<td>5 (14.29)</td>
</tr>
<tr>
<td>Radical prostatectomy</td>
<td>3 (8.57)</td>
</tr>
<tr>
<td>Radiation treatment</td>
<td>3 (8.57)</td>
</tr>
</tbody>
</table>

GG, grade group; PGC, prostate gland cryoablation; PI-RADS V.2, Prostate Imaging-Reporting and Data System V.2; PSA, prostate specific antigen.

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**Figure 2** Changes in radiographical and pathological features between baseline and post-PGC. Bar graphs showing changes in PI-RADS category (A) and grade group (B) and box and whisker plots showing changes in PSA (C) between baseline and post-PGC. GG, grade group; PGC, partial gland cryoablation; PI-RADS, Prostate Imaging-Reporting and Data System.
effects associated with traditional whole-organ therapy, such as urinary incontinence and sexual dysfunction. As men are willing to make trade-offs between side effects of treatment and cancer control, prostate gland ablation may preserve health related quality of life and delay definitive therapy. However, the Idea, Development, Exploration, Assessment and Long-term study (IDEAL) categorises partial gland ablation at development stage 2A for surgical innovation because comparative outcome evidence is lacking.

Our pilot IDEAL stage 2A study has several important findings. It is the first to demonstrate that in-office PGC under local anaesthesia is feasible, reproducible and well tolerated. Natarajan et al described the performance of focal laser ablation in a clinic setting under local anaesthesia; however, all subjects had intravenous access for pain medications and sedation administration. In the current series, none of the subjects required intravenous sedation and only four (7.3%) needed an oral benzodiazepine for the procedure. Furthermore, there may inherent advantages in performing cryoablation versus, other energy modalities under general anaesthesia. For instance, once the cryoablation probe is activated and ‘stuck’, it remains fixed in place refractory to moderate movement; whereas other energies require complete absence of movement.

Second, we found favourable functional outcomes with no significant change in pretreatment versus post-treatment urinary and sexual function. This is consistent with a multicentre prospective study of 122 men from the UK, who underwent focal cryotherapy for intermediate-risk to high-risk prostate cancer. Similarly, none of the men had urinary incontinence at 3 years, although 16% experienced erectile dysfunction. Moreover, our in-office approach for PGC was safe and adverse event evaluation showed 22 CTCAE V.5 score 2 and only five CTCAE V.5 score 3 complications in 55 men. The most common CTCAE V.5 score 2 adverse events were urinary retention and urinary tract infections that were treated with urethral catheter drainage and oral antibiotics, respectively. These adverse events compare favourably to other series. For instance, 6 out of 10 men had a CTCAE V.5 score 2 adverse events after focal laser ablation therapy under local anaesthesia. Bass et al reported Clavien-Dindo grade I in 35 (23%) men, grade II in 12 (8%) men and grade III in four (2.6%) out of 153 men that underwent HIFU for localised prostate cancer. Similarly to our series, urinary retention was the most common adverse event.

**Table 3** Baseline, 4 months and 9 months post prostate partial gland cryoablation quality-of-life outcomes

<table>
<thead>
<tr>
<th>EPIC-CP, n (%)</th>
<th>Baseline</th>
<th>4 months post-PGC</th>
<th>9 months post-PGC</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall urinary function</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No problem</td>
<td>22 (52.38)</td>
<td>19 (57.58)</td>
<td>13 (59.09)</td>
<td></td>
</tr>
<tr>
<td>Very small problem</td>
<td>4 (9.52)</td>
<td>8 (24.24)</td>
<td>2 (9.09)</td>
<td></td>
</tr>
<tr>
<td>Small problem</td>
<td>8 (4.0)</td>
<td>4 (12.12)</td>
<td>6 (27.27)</td>
<td></td>
</tr>
<tr>
<td>Moderate problem</td>
<td>6 (14.29)</td>
<td>1 (3.03)</td>
<td>1 (4.55)</td>
<td></td>
</tr>
<tr>
<td>Big problem</td>
<td>2 (4.76)</td>
<td>1 (3.03)</td>
<td>0 (0.00)</td>
<td></td>
</tr>
<tr>
<td>Incontinence symptom score, mean (SD)</td>
<td>0.71 (1.37)</td>
<td>1.17 (1.56)</td>
<td>1.21 (1.72)</td>
<td>0.20/0.23*</td>
</tr>
<tr>
<td>Sexual function score, mean (SD)</td>
<td>3.41 (3.32)</td>
<td>4.84 (3.55)</td>
<td>3.83 (3.76)</td>
<td>0.08/0.67*</td>
</tr>
</tbody>
</table>

*Baseline vs 4 months PGC and 9 months PGC, respectively.

EPIC-CP, Expanded Prostate Cancer Index-Clinical Practice; PGC, partial gland cryoablation.
ultrasonography

edge of the ice-
laser ablation, PGC may be monitored with real-

Natarajan


6

tate cancer on 6-

Mortezavi et al

were comparable to other

and described an in-
focal

Table 5 Comparison of time-driven activity-based costing between in-office prostate PGC, ambulatory surgery centre PGC and HIFU prostate gland ablation

<table>
<thead>
<tr>
<th>In-office PGC</th>
<th>ASC PGC</th>
<th>HIFU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable costs</td>
<td>US$3,086.44 (2,753.71–5,753.71)</td>
<td>US$3,086.44 (2,753.71–5,753.71)</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>US$305.73 (262.60–413.57)</td>
<td>US$1,859.31 (1,404.78–2,995.63)</td>
</tr>
<tr>
<td>MRI-targeting biopsy platform cost</td>
<td>US$1,070.88</td>
<td>US$1,070.88</td>
</tr>
<tr>
<td>Total costs</td>
<td>US$4,463.05 (4,087.19–7,238.16)</td>
<td>US$6,016.63 (5,229.37–9,820.22)</td>
</tr>
</tbody>
</table>

Median (range) in dollars.

*Disposable cost is fixed

ASC, ambulatory surgery centre; ;HIFU, high-intensity focused ultrasound; N/A, not available; PGC, partial gland cryoablation.

event (20 men, 13.1%). In contrast to HIFU and focal laser ablation, PGC may be monitored with real-time ultrasonography, with 0°C temperatures at the leading edge of the ice-ball.

The short-term oncological outcomes of in-office PGC were comparable to other partial gland ablation modalities under general anaesthesia. In our series, the recurrence rate was 37% at 6 months. Similarly, Mortezavi et al report a 41% detection rate of clinically significant prostate cancer on 6-month biopsy after HIFU. Likewise, Natarajan et al recently reported an in-office, transrectal foca laser ablation experience using Artemis guidance, and described an in-field recurrence rate of 40% with GG

2 or 3 on follow-up 6-month biopsy. The difference in in-field recurrence rates between Natarajan et al and our study may be due to the lower radius of laser ablation as compared with cryoablation. Furthermore, all 10 participants in the Natarajan et al study had higher GG disease (GG≥3) compared with our study, where only 23 out of 55 patients (41.8%) had GG≥3. This may also help explain our lower recurrence rates.

We observed that definitive treatment after PGC was feasible and safe. None of the three men who underwent salvage radical prostatectomy experienced complications. All three men required 0–1 pads (EPIC-CP score 0–1) and had erections sufficient for intercourse at 4-month follow-up (EPIC-CP score 0–1). Consistent with our results, a recent systematic review on treatment options after failure of focal therapy showed promising oncological outcomes, and urinary and sexual function outcomes that are not markedly different from those associated with primary treatment.

Finally, with greater emphasis on value-based care nationally, with value defined as outcomes/costs, we examined resource utilisation and costs of this versus other partial gland ablation approaches. Therefore, we performed TDABC analysis to evaluate in-office PGC under local anaesthesia. We demonstrated that the cost of in-office PGC is almost 50% and 75% of the costs of HIFU and PGC at an ambulatory surgery centre, respectively. The major cost driver of PGC was disposables that comprised more than two-thirds of the total cost. Nevertheless, by eliminating the need for general anaesthesia and/or sedation, we demonstrated that in-office PGC is a cost-effective alternative to ASC PGC and HIFU. In the absence of demonstrating superior outcomes for competing partial gland ablation technologies, the lowest cost approach offers the best value.

Our study must be interpreted in the context of the study design. First, this is a non-comparative study and long-term outcomes are needed to assess cancer control. Because this is an IDEAL 2A study, our focus is on safety and feasibility. Additional follow-up is needed to attain long-term oncological outcomes for in-office PGC. However, our study is noteworthy, as it illustrates that
PGC, we did not model costs of complications related to similar analysis demonstrates the cost-
propriate follow-
However, adherence to biopsy surveillance is critical, as the proper follow-up beyond a clinical trial mandated end of study biopsy is still uncertain.

CONCLUSIONS
We demonstrate that in-office PGC under local anaesthesia is technically feasible and safe for men with localised prostate cancer. In-office PGC demonstrated comparable short-term oncological control and functional outcomes versus HIFU and PGC series performed under general anaesthesia. Despite favourable short-term outcomes, more studies assessing long-term biopsy results are needed before widespread dissemination.

REFERENCES

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Competing interests None declared.
Ethics approval The Institutional Review Boards of Urological Research Network (FL, USA) and NewYork-Presbyterian/Weill Cornell Medicine (NY, USA) approved this study (13–1010 and 170201801, respectively).
Provenance and peer review Not commissioned; externally peer reviewed.
Data availability statement Data are available on reasonable request.
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