Oncological and functional outcomes of laparoscopic radical prostatectomy following fellowship training.

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Abstract:	Objective: To assess the oncological and functional outcomes of laparoscopic radical prostatectomy (LRP) following fellowship training. Patients and Methods: A total of 152 consecutive patients underwent extraperitoneal LRP in 1 metropolitan and 2 provincial centres in Queensland and northern NSW. All procedures were performed by 2 surgeons who had recently completed international fellowship training in LRP. Positive surgical margin (PSM) rates were assessed in accordance with the ISUP guidelines. Continence was defined as pad free rates and potency assessed using the SHIM questionnaire. Results: The median age was 61 (44-74) yrs, median BMI 27 (20-37) kn/m2, and median PSA 6.1 (0.7-30) ng/ml. Clinical stage T1c was present in 42% reflecting an unscreened population. Similarly preoperative Gleason Sum 6 disease was present in 13%, Gleason 7 in 74% and Gleason 8-10 in 13%. Final pathological stage was pT2 in 57.6% and pT3 in 42.4%. The PSM rates for pT2 and pT3 disease were 1.1% and 32.8% respectively. The 12 month pad free rate was 95%. At 6 weeks post-operatively, 50% of previously potent men who had undergone bilateral nerve-sparing procedures had achieved penetrative intercourse while at 12 months 83% were potent. Conclusion: Fellowship training in LRP has afforded low PSM rates and high

	potency and continence rates. Additionally 2 of the 3 centres in this series were non-metropolitan indicating that it is the surgeon and not the location of practice that dictates outcomes. Finally, in comparison to RALRP which is often restricted to metropolitan centres, LRP allows minimally-invasive surgery to be delivered in provincial communities.

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Oncological and functional outcomes of laparoscopic radical prostatectomy following fellowship training.

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ABSTRACT

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Patients and Methods: A total of 152 consecutive patients underwent extraperitoneal LRP in 1 metropolitan and 2 provincial centres in Queensland and northern NSW. All procedures were performed by 2 surgeons who had recently completed international fellowship training in LRP. Positive surgical margin (PSM) rates were assessed in accordance with the ISUP guidelines. Continence was defined as pad free rates and potency assessed using the SHIM questionnaire.

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Conclusion:

Fellowship training in LRP has afforded low PSM rates and high potency and continence rates. Additionally 2 of the 3 centres in this series were non-metropolitan indicating that it is the surgeon and not the location of practice that dictates outcomes. Finally, in comparison to RALRP which is often restricted to metropolitan centres, LRP allows minimally-invasive surgery to be delivered in provincial communities.

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INTRODUCTION

Radical prostatectomy has undergone a revolution in recent times with the introduction of laparoscopic radical prostatectomy (LRP) and more recently robotic-assisted LRP (RALRP). LRP and RALRP are relatively new to Australia but are now becoming increasingly adopted, particularly with the introduction of robotic technology and the availability of international fellowships in minimally-invasive surgery.

Debate continues as to the pros and cons of open radical prostatectomy (ORP), LRP and RALRP. However recent extensive reviews demonstrate equivalence in the trifecta outcomes of cancer control, continence and potency. [1-3] It is well accepted that surgical experience is more predictive of outcomes rather than the approach used. [3,4] In addition, each procedure has a well documented learning curve. However fellowship training may decrease this curve. [5] LRP has only been recently introduced into Queensland and northern New South Wales (NSW). Herein we describe the experience of 2 fellowship trained surgeons in establishing a new laparoscopic radical prostatectomy program in Queensland and northern NSW following fellowship training.

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METHODS

Both surgeons had previously undergone dedicated international fellowship training TRJG (UK and USA) and CC (UK) in high volume centres. All procedures were

performed in 3 hospitals namely The Wesley Hospital, Brisbane, Qld, The John Flynn Hospital, Tugun, Qld, and the Lismore Base Hospital, Lismore, NSW. LRP was performed via a 5 port open access extraperitoneal approach. The extraperitoneal space was developed using a balloon expander (Covidien, Mansfield, MA, USA) inserted via an infra-umbilical incision. A structural balloon trocar (Covidien, Mansfield, MA, USA) was then placed following which 2 x 5mm ports were placed just medial to the ASIS on each side, and left and right 11mm ports were placed immediately lateral to and medial to the left and right inferior epigastric vessels respectively in the classical inverted U format. The prostate was defeated and the endopelvic fascia incised. Early in the series the DVC was controlled with a single 0/0 vicryl suture on a CT-1 needle. As the series progressed, a 0/0 PDS suspension suture was also applied. The anterior bladder neck was then incised with hook diathermy and the prostate elevated by a 22 Fr urethral sound, held in place by either a second assistant or the scrub nurse. The posterior bladder neck was reflected to gain access to the posterior structures at which point the use of all thermal energy was absolutely ceased. The vasa were divided, the seminal vesicles fully mobilised and the rectum reflected in the midline. The prostatic pedicles were secured using Hem-o-lok clips (Teleflex Medical, NC, USA) and then divided with cold scissors. Nerve sparing was performed in a strictly athermal fashion in which the lateral prostatic fascia was incised and reflected. Following this the neurovascular bundles (NVBs) were mobilised in an antegrade interfascial or intrafascial fashion to the prostatic apex. The choice of fascial plane was dependent on the risk of extracapsular tumour extension. Early in the series in instances in which it was deemed not to preserve the NVBs, a 5mm ligasure (Covidien, Mansfield, MA, USA) was used to control the lateral pedicle and excise the

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NVBs. However as the series progressed we eliminated all thermal energy in non-nerve sparing cases in order to minimise any potential thermal injury to any remaining nerve tissue from the NVBs or from adjacent accessory neural pathways. Following full posterior and lateral mobilisation of the prostate, the DVC and urethra were divided and an interrupted anastomosis fashioned over an 18rf catheter with bladder neck reconstruction if needed. Lymph node dissection was performed in select cases if the risk of lymph node metastases was calculated as >=5% via the MSKCC prostate nomogram. A non-suction drain was placed and laparoscopic exit performed. The catheter was removed typically on day 10-14.

All pathological specimens were examined by the same uropathologist (HS) experienced in the reporting of prostatectomy specimens and who had previously undertaken dedicated fellowship training in Uropathology at Johns-Hopkins University. Immediately after removal, each prostate gland was transported to the pathology laboratory where it was weighed and measured. After fixation in 10% neutral buffered formalin, the radical prostatectomy specimen was painted with two colours to indicate the right and left sides. The prostate gland was sectioned and embedded in entirety. Specifically, the SV and vas deferens were removed by a transverse section taken as close as possible to the prostatic base and weighed. The next transverse slice, which represented the prostate base, was serially sectioned in a vertical parasagittal plane, allowing visualisation of the entire superior surface of the gland. The body of the prostate was serially sectioned at 4 mm intervals in a transverse plane perpendicular to the rectal surface. The apical slice was then serially sectioned in a vertical parasagittal plane. Each SV was transversely sliced

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and the entire gland was blocked, being divided into proximal, mid and distal thirds. All submitted lymph nodes were also completely sampled. The location of each tumour nodule in the prostate was noted during the dissection of the gland, and the highest Gleason score of a tumour nodule was taken to be the final Gleason score of the carcinoma in each case. A positive surgical margin (PSM) was defined as clear evidence of ink on cancer cells in accordance with International Society of Uropathologists (ISUP) guidelines.

All data were prospectively collected and analysed with hospital ethics committee approval. Operative times were defined as time from skin incision to final skin closure. Potency was measured with preoperative and postoperative SHIM scores with or without the use of PDE5 inhibitors. As definitions of potency in the literature vary, potency is defined as penetrative intercourse rates with or without the use of PDE5 inhibitors, with the addition of median SHIM score to qualify the quality of the erection. Continence is defined as pad free rates. The use of a security pad is defined as incontinent. Data are presented with median and range.

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RESULTS

Since November 2007 a total of 152 consecutive cases were performed by 2 surgeons who had recently completed advanced laparoscopic training with particular focus on laparoscopic radical prostatectomy (TG and CC). Demographic data are presented in Table 1. There was no case selection in the series. Any patient who was a candidate for

radical prostatectomy was considered a candidate for LRP. The median age was 61 (44-74) yrs, median BMI 27 (20-37) kn/m2, and median PSA 6.1 (0.7-30) ng/ml. Only 42% of patients had T1c disease in accordance with an unscreened, predominantly rural referral population. The predominant preoperative Gleason Sum was 7 (74%) while only 13% of patients had a preoperative Gleason sum of 6 again in keeping with an unscreened, unselected population. Gleason sum 8-10 was present in 13%.

Median operative time defined as time from skin incision to final skin closure for the series was 180minutes while median estimated blood loss was 275ml. One patient with a 103g prostate and a prominent middle lobe who had had a catheter in for 5 weeks preoperatively because of refractory urinary retention required conversion to open surgery because of significant catheter cystitis and marked periprostatic inflammation and has been excluded from the analysis. During this case significant bleeding from the friable bladder neck was encountered as a result of the catheter cystitis which obscured the operative view. This, in addition to the marked periprostatic inflammation, precluded safe bladder neck dissection.

Final pathological stage was pT2 in 57.6% of which 72% were pT2c reaffirming that there was no case selection in the series (Table 2). Stage pT3 was present in 42.4% of cases. A total of 42.3% of cases had extensive tumour volume more than 3.00cc while only 2.2% of cases had tumour volumes <0.5cc. The pT2 positive margin rate was 1.1% (1/86 cases) while the pT3 PSM rate was in 32.8%.

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Planned adjuvant radiotherapy was administered to 5 patients with high volume pT3 disease. PSA progression occurred in one patient who presented with a PSA of 15 and Gleason 4+3 in 2 biopsy cores and on final pathology had pT3a disease with clear margins and negative lymph nodes.

At 1 week, 28% of patients were pad free. This increased to 95% at 1 year (Table 3). Bilateral nerve preservation was performed in 74 patients while a unilateral nerve sparing procedure was performed in 35 patients (table 4). Of those patients who were preoperatively potent, 83% of patients were potent at 1 year with a median SHIM score of 22 (range 20-25).

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DISCUSSION

The outcomes of ORP, LRP and RALRP in terms of cancer control, continence and potency are comparable without any single technique demonstrating clear superiority. Excellent results can be achieved in any of these techniques and are more dependent on the experience of the surgeon rather than the technique used. [4] RALRP has been taken up with enthusiasm in the USA and now also in Australia. This theoretically allows laparoscopically naïve surgeons an opportunity to provide a minimally invasive service without the need to undertake prolonged training and time away from their practice.

However despite this several hundred cases are required to become proficient in RALRP and outcomes of RALRP vary widely and reflect the experience for the practitioner.

Radical prostatectomy is a complex procedure with a significant learning curve irrespective of whether it is undertaken open, laparoscopically or robotically. The number of cases reported to overcome the "learning curve" vary widely in the literature and are dependent on how the learning curve is defined and the scrutiny of operative outcomes, but it is generally accepted to be several hundred case for all three approaches. [6-8] Indeed the concept of multiple ongoing learning curves is recognized even with vast experience in radical prostatectomy. [7] Fellowship training is known to reduce these learning curves and improve operative outcomes, [5] The primary outcome of RP is oncological control and it is sensible therefore to use oncological parameters as a learning curve indicator. PSM rate for pT2 disease is a useful indicator of technical proficiency and indeed Hong et al have used this as a measure of the learning curve in RALRP and have defined it as the "oncological experience curve". [8] In their analysis the authors noted that the PSM for organ confined disease decreased to 10% after 290 cases. [8] Given that oncological control is the primary aim of RP, it would appear prudent that measures of oncological efficacy should be used in learning curve definitions. Hong et al reasonably argue that the "oncological experience curve" reflects the time taken for when the surgeon is not placing the patient at unnecessary oncological risk resulting from poor surgical technique. [8] In assessing the learning curve acquisition in RALRP, Stricker et al similarly noted that pT2 and pT3 PSM rates started to plateau after 140 and 170 cases respectively with pT2 PSM rate of 11.6% and a pT3 PSM rate of 40.5%. [9] With similar

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sentiment, Vickers et al found that the learning curve for biochemical recurrence following open radical prostatectomy did not start to plateau until surgical experience had reached 250 cases, while for LRP the risk of biochemical recurrence at 5 years decreases successively from 17% to 16% to 9% for a patient treated by a surgeon with an experience of 10, 250 and 750 cases respectively. [6,10]

In this paper we report the out comes of 2 fellowship trained surgeons in LRP. In this series there was no case selection. Only 49% of patients had clinical, T1 disease while almost half of the patients in the series had pathological T3 disease. Similarly almost half of the patients in the cohort had extensive disease as defined by a tumour volume in excess of 3.00cc. PSM rates in pT2 disease reflect technical issues with surgical technique whilst PSM rates in pT3 disease more reflect disease volume and tumour pathology. In this series the PSM rate in pT2 disease was 1.1% which compares favourably to published series of ORP, LRP and RALRP.

The one year pad free rate in this series was 95%. Continence is often defined as including the use of a security pad in which case 98% of patients in this series could be considered as continent. However we have adopted the stricter definition of pad free rates. In this series 50% of preoperatively potent patients had achieved penetrative intercourse by 6 weeks postoperatively, while 83% were potent at 12 months with a median SHIM score of 22 and a minimum SHIM score in these patients of 20.

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It is noteworthy that only one of the hospitals (Wesley Hospital, Brisbane) in this series is a major metropolitan hospital. The remaining 2 hospitals, being the John Flynn Hospital and the Lismore Base Hospital are regional units. By comparison to both LRP and ORP, RALRP is only available in centres in which a robotic unit is present. This then geographically restricts access of patients to the unit, so that rural patients need to travel in order to have their surgery. In addition the cost of RALRP may be beyond the affordability of many patients. The costs of disposables alone in Australia are approximately $4500 per case which may not covered by the health funds and the service fee is typically in the order of $2000 per case. By comparison LRP is significantly cheaper, with disposables costing around $1500 per case.

This series has demonstrated low PSM rates and high continence and high potency rates, in 3 centres, 2 of which are non-metropolitan. These results compare favourably to published series of ORP, LRP and RALRP suggesting that it is the training of the surgeon and not the technique employed that dictates trifecta outcomes. Similarly it is the training of the surgeon and not the location of their practice that dictates outcomes. Finally, in comparison to RALRP which is restricted to high volume metropolitan centres, LRP may be offered in multiple sites.

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Table 1: Demographic data

Age	61 (44-74)
BMI	27 (20-37)
PSA	6.1 (0.7-30)
Gleason Grade	
6	13%
7	74%
8-10	13%
Clinical Stage	
T1a	7%
T1c	42%
T2	51%

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Table 2: Final Pathological Stage and Volume

Pathological Stage	
pT2	57.6%
pT2c	72%
pT3	42.4%
Tumour Volume	
<0.5cc	2.2%
0.5-3.0cc	45.5%
>3.0cc	42.3%

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Table 3: Continence (pad free) rates.

1 week	**28%**
3 months	**67%**
6 months	**86%**
9 months	**91%**
12 months	**95%**
18 months	**100%**

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Table 4: Intercourse rates following bilateral nerve-preservation in pre-operatively potent men with or without the use of PDE5 inhibitors.

	Intercourse +/- PDE5	Median SHIM
4-6 weeks	50%	16
3 months	62%	17
6 months	67%	18
9 months	80%	19
12 months	83%	22

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