Trends in percutaneous renal biopsy: The evolving diagnostic pathway for the small renal mass

INTRODUCTION

The incidental diagnosis of small renal masses (SRMs) is becoming more prevalent with the increased use and improved resolution of radiological imaging modalities. Current practice for suspicious SRM typically includes active surveillance, invasive surgical resection, or ablative therapies. These invasive treatment options may be associated with significant morbidity and may not be suitable for elderly patients. Not infrequently, these lesions are either benign or of low malignant potential – suggesting potential overtreatment of SRMs.[1] As such, there is a need to reduce the number of unnecessary invasive treatments, particularly in high-risk patients.

Traditionally, percutaneous renal biopsy (PRB) has been reserved for the diagnosis of benign renal disease, suspected renal secondary metastatic deposits or for confirmation of renal origin of metastatic disease before systemic therapies. Over the past decade, an increasing body of literature is reporting the use of PRB in the primary diagnostic assessment of SRMs to guide clinical management.[2] Increased experience has improved the diagnostic yield for PRB, providing critical information to guide treatment decisions. Despite this, debatable clinical utility has limited the uptake of PRB globally. At present, no formal Australian guidelines, renal cancer guidelines, exist recommending the use of PRB in clinical practice. We aim to assess the rates of PRB and assess regional and demographical trends within Australia over the last 15 years.

CURRENT AUSTRALIAN TRENDS IN RENAL BIOPSY

Between July 2000 and June 2015, 12-monthly data regarding PRB were extracted from the Medicare Australia website (Medicare Benefit Schedule [MBS] code 36561) in Australian financial year format, e.g., 2000/2001.[3] We assigned the latter year to the obtained biopsy quantity. Data were stratified by year, age, gender, and state. We excluded biopsies performed on pediatric patients aged <15 years. Corresponding population data were extracted from the Australian Bureau of Statistics for 2001–2015.[4] State-based hospital data were obtained from the Australian Institute of Health and Welfare.[5] Baseline demographical, population, and hospital data are represented in Table 1. We calculated incidence rates per 100,000 people using a population denominator specific to the year and gender, state, or age range. To evaluate the growth or decline of biopsy rates, we used univariable linear regression with year as the independent variable. Data analysis was performed using Stata version 12.0 SE (College Station, TX, USA).

During the study period, 13,569 PRBs were performed in Australia. During this period, rates of PRB doubled from 4.0 to 8.6 per 100,000 population [Figure 1]. State-based differences in PRB incidence were noted [Figure 2]. There was a sharp rise in New South Wales (NSW) from 2008 onward with the estimated year-on-year increase in biopsies for NSW changing from 0.09 (95% confidence interval [CI]: –0.12–0.30) to 1.2 (95% CI: 0.8–1.6) before and after 2008, respectively. Other states remained relatively stable with yearly increases ranging from –0.3 to –0.2. Rises in rates were more pronounced in older patients [Figure 3]. The mean yearly percentage rise for patients aged 55 years and over was 6.3% versus 3.7% for patients under 35.

DISCUSSION

A significant regional heterogeneity in PRB uptake was observed from our analysis. This inconsistent uptake

Table 1: Baseline state-based demographical and hospital data

State	Hospital facilities (2015)		Population (2015)	Male (%)	Age distribution (%), years				Number of biopsies
	Public	Private			15-34	35-54	55-74	75+	
New South Wales	228	203	6,190,376	49.2	33.8	32.6	25.1	8.6	942
Victoria	151	167	4,852,379	49.0	34.9	32.9	23.9	8.2	308
Queens Land	122	109	3,834,862	49.4	34.6	33.3	24.7	7.4	235
Western Australia	92	60	2,092,545	50.4	36.2	33.8	23.1	6.9	75
South Australia	82	55	1,399,706	49.2	32.1	31.7	26.6	9.6	34

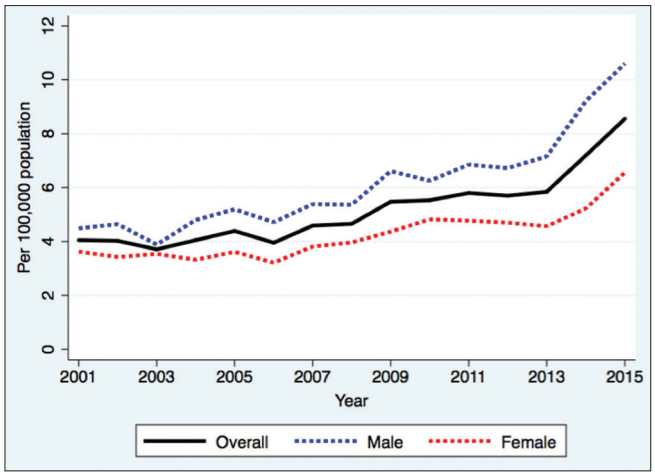

Figure 1: Yearly incidence of percutaneous renal biopsies overall and stratified by gender

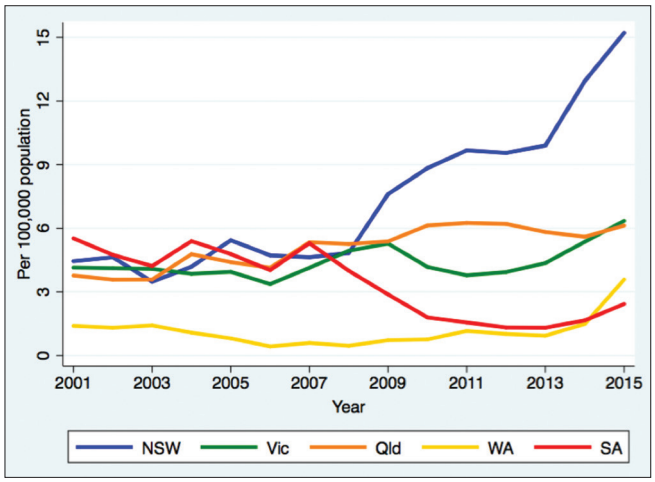

Figure 2: Yearly incidence of percutaneous renal biopsies stratified by state

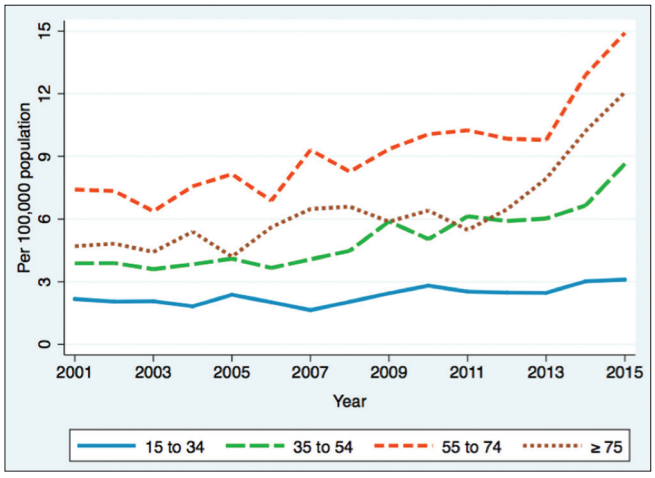

Figure 3: Yearly incidence of percutaneous renal biopsies stratified by age group

suggests considerable variation in practice patterns across Australia. Accordingly, there is an inherent need for consensus in the role of PRB in the diagnosis of SRM. Such consensus would allow for the delivery of standardized and consistent patient care within Australia. The regional variation in practice patterns highlights the controversial nature of PRBs, likely regarding the diagnostic yield and debatable clinical utility.

Increasing experience has corresponded with improved diagnostic yield in high-volume centers. Richard *et al.* reported among the largest series of PRB for SRM and reported a diagnostic yield of 90% on the first biopsy and increased to 94% on the second biopsy.[2] In addition, a recent systematic review and meta-analysis reported a diagnostic yield of 92% for malignancies, with a sensitivity and specificity of 99.1% and 99.7%, respectively.[6] The clinical utility of PRB for SRM may be addressed by the degree of concordance between biopsy and definitive resection histopathology. Concordance of PRB, histopathology has been reported at >80% in differentiating benign versus malignant pathology.[7] This is of importance as up to 26% of PRBs for SRMs are benign.[2] Intuitively, in these cases, surgical and ablative therapies may be avoided – reducing the rates of overtreatment. Similarly, treatment may be avoided if a diagnosis of malignancy with favorable histology or secondary metastatic deposit. Richards *et al.* reported that up to 41% of their PRB cohort avoided surgical or ablative therapies for the aforementioned reasons.[2]

There are several limitations with the current method of data collection. First, there are inherent limitations with the used of MBS-based billing data as data are dependent on the accurate billing clinicians. Despite these concerns, MBS-based data have been validated for use in the setting of various oncological procedures, including melanoma excision.[8] Finally, there are multiple indications for renal biopsy, which were not available for stratification including: Diagnostics for SRMs and medical renal diseases. Despite this, our study highlights the relative stability in PRB in patients <35 years, the typical patient cohort representative for renal biopsy for medical purposes. Conversely, a steady increase in PRB was observed in patients >55 years, likely for diagnosis of suspicious renal masses. Finally, due to the nature of the data, it is not possible to accurately discern the cause of the significant locoregional heterogeneity in practice patterns.

CONCLUSION

Contemporary literature supports the use of renal biopsy for investigation of SRMs, with diagnostic yield of up to 90% on initial biopsy. This recent practice shift has

coincided with increased Medicare billings of PRB in Australia over the past 15 years. Despite this, the uptake of PRBs has been heterogenous across Australia, with several states outperforming others. There is a need for consensus in practice regarding the role of PRBs to provide consistent care across Australia.

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Conflicts of interest

There are no conflicts of interest.

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