CHAPTER 5

Renal Allograft Biopsy

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5.1 Introduction

The systematic collection of renal allograft biopsy data was first started in the Department of Nephrology, Hospital Kuala Lumpur in 2004 and by 2005, has involved all the Ministry of Health hospitals in the country.

5.2: Number of renal allograft biopsy

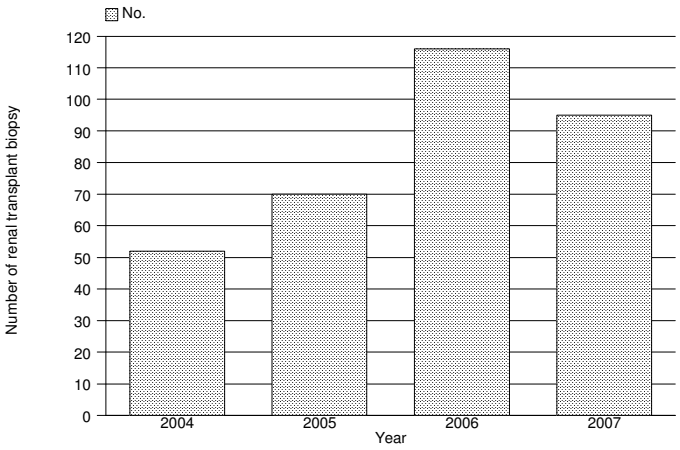
5.2.1: Number of renal allograft biopsy by year

There is increasing trend in the number of renal allograft biopsy performed and the numbers has nearly doubled over the last 4 years despite a decreased in the number of new transplant recipients (189 new transplant recipients in 2004 compared to 86 in 2007) and only a marginal increased in the number of functioning renal graft (1590 functioning grafts in 2004 compared to 1726 in 2007) during the same period (Table & Figure 5.2.1.). This marked increased in the number of renal allograft biopsies performed in recent years is probably a result of the changing trend in the management of renal transplant recipients.

Table 5.2.1: Number of renal allograft biopsy, 2004-2007

Year	2004	2005	2006	2007	Total
No of renal allograft biopsy	52	70	116	95	333

Figure 5.2.1: Number of renal allograft biopsy, 2004-2007



5.2.2: Number of renal allograft biopsy by year and site

In 2007, of the 21 participating centres, renal allograft biopsies were performed in only 9 centres with 92% of the biopsies performed in 4 centres in the Klang valley (Table 5.2.2). Three of these centres are renal transplant centres which are actively involved in the care of renal transplant recipients during the peri-operative and early post renal transplant period. The large number of renal allograft biopsies performed in these 4 centres is also partly contributed by the large number of renal transplant recipients that is being followed up in these centres.

Table 5.2.2: Number of renal allograft biopsy by year and SDP, 2004-2007

SDP	2004		2005		2006		2007		Total	
	n	%	n	%	n	%	n	%	n	%
1	47	90	28	40	50	43	43	45	168	50
2	0	0	0	0	0	0	0	0	0	0
3	0	0	12	17	11	9	2	2	25	8
4	0	0	0	0	1	1	0	0	1	0
5	0	0	1	1	2	2	2	2	5	2
6	0	0	5	7	10	8	13	14	28	8
7	0	0	0	0	1	1	1	1	2	1
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	2	2	1	1	3	1
10	0	0	0	0	2	2	0	0	2	1
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	0	0	4	6	3	3	0	0	7	2
16	0	0	2	3	2	2	2	2	6	2
17	4	8	1	2	13	11	9	10	27	8
18	1	2	17	24	18	15	22	23	58	17
19	0	0	0	0	1	1	0	0	1	0
20	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0
Total	**52**	**100**	**70**	**100**	**116**	**100**	**95**	**100**	**333**	**100**

5.2.3: Number of renal allograft biopsy by year and age group.

Majority of the renal allograft biopsies were performed in the age group of 15 to <55years and this pattern remained relatively unchanged over the last 4 years (Table 5.2.3). This probably reflects the transplant recipients' demography in this country. However in recent years, there is an increasing trend in the number of allograft biopsies performed in older transplant recipients. Allograft biopsies performed in the older age group (older than 45 yrs old) has increased from 11% in 2004 to 30% in 2007 (Table 5.2.3).

Table 5.2.3 Renal allograft biopsy by year and age group, rate (per million population), 2004-2007

Age	2004			2005			2006			2007			Total		
group	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate	n	%	Rate
<15	3	6	0.1	0	0	0	5	4	0.2	6	6	0.2	14	4	0.1
15-<25	14	27	0.5	15	21	0.6	26	22	1	16	17	0.6	71	21	0.7
25-<35	15	29	0.6	11	16	0.4	24	21	0.9	12	13	0.4	62	19	0.6
35-<45	14	27	0.5	23	33	0.9	25	22	0.9	32	34	1.2	94	28	0.9
45-<55	4	7	0.2	12	17	0.5	24	21	0.9	20	21	0.7	60	18	0.6
55-<65	2	4	0.1	6	9	0.2	8	7	0.3	9	9	0.3	25	8	0.2
≥65	0	0	0	3	4	0.1	4	3	0.2	0	0	0	7	2	0.1
Total	**52**	**100**	**2**	**70**	**100**	**2.7**	**116**	**100**	**4.4**	**95**	**100**	**3.4**	**333**	**100**	**3.2**

5.3: Clinical presentation at biopsy

The most common indications for renal allograft biopsy were impaired renal allograft function and acute renal allograft dysfunction. This remained unchanged over the last 4 years and in 2007 accounted for 94% of the total number of renal allograft biopsies performed (Table 5.3).

Table 5.3: Indications for renal allograft biopsy, 2004-2007

Indications for biopsy		2004		2005		2006		2007		Total	
		n	%	n	%	n	%	n	%	n	%
Urine abnormalities	Asymptomatic hematuria	0	0	0	0	2	2	0	0	2	1
	Asymptomatic hematuria&proteinuria	0	0	0	0	0	0	0	0	0	0
	Asymptomatic proteinuria	0	0	0	0	0	0	0	0	0	0
	Nephrotic syndrome	1	2	0	0	3	3	2	2	6	2
	Gross haematuria	0	0	0	0	0	0	1	1	1	0
Acute deterioration of graft function		34	64	39	56	54	45	47	48	174	51
Creeping creatinine		5	9	24	34	49	41	35	36	113	33
Non/Poor delayed graft function		8	15	6	9	10	8	9	10	33	10
Missing*		5	9	1	1	1	1	3	3	10	3
Total		**53**	**100**	**70**	**100**	**119**	**100**	**97**	**100**	**339**	**100**

Patients may have one or more clinical presentation

* No information on clinical presentation

For 2004, 1 patient has 2 indications

For 2006, 3 patients have 2 indications

For 2007, 2 patients have 2 indications

5.4: Timing of renal allograft biopsy

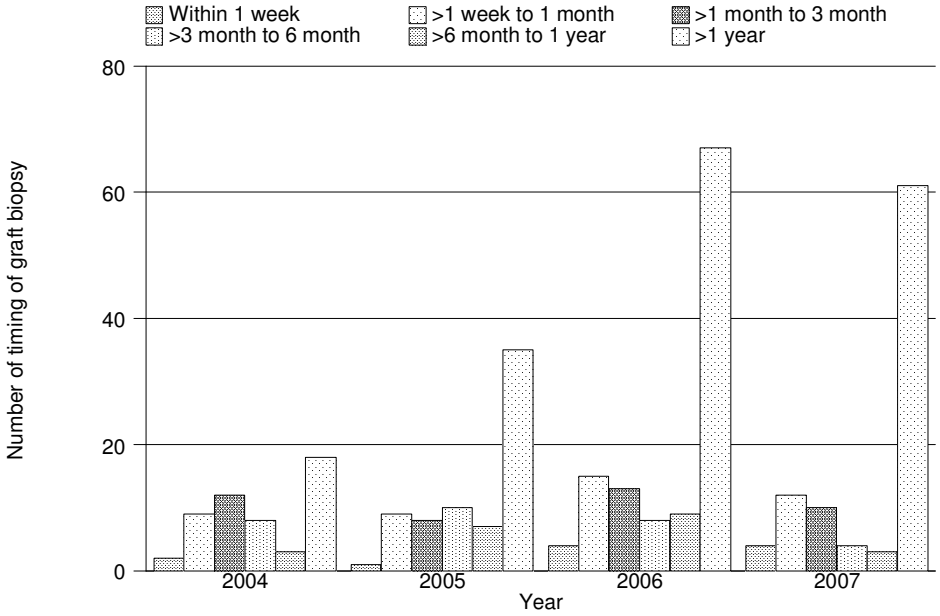
The number of renal allograft biopsies performed within the first six months post renal transplantation remained relatively unchanged over the last 4 years (Table 5.4). The increased in the numbers of renal allograft biopsies performed in 2007 is contributed by the marked increased in the renal allograft biopsies performed in recipients after 1 year post transplant (Table and Figure 5.4). This reflects the increasingly importance of chronic allograft nephropathy among renal transplant recipients.

Table 5.4: Timing of renal allograft biopsy, 2004-2007

Timing of allograft biopsy *	Within 1 week		>1 wk to 1 mth		>1 mth to 3 mths		>3 mths to 6 mths		>6 mths to 1 year		>1 yr		Missing**		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2004	2	4	9	16	12	23	8	15	3	6	18	35	0	0	52	100
2005	1	1	9	13	8	11	10	14	7	10	35	50	0	0	70	100
2006	4	3	15	13	13	11	8	7	9	8	67	58	0	0	116	100
2007	4	4	12	13	10	11	4	4	3	3	61	64	1	1	95	100
Total	**11**	**4**	**45**	**14**	**43**	**13**	**30**	**9**	**22**	**7**	**181**	**54**	**1**	**0**	**333**	**100**

*Timing of renal allograft biopsy: from date of transplantation
** No data information on date of graft treatment

Figure 5.4: Timing of renal allograft biopsy, 2004-2007



5.5: Biopsy procedure

5.5.1: Biopsy method

Over the last 4 years, nearly all renal allograft biopsies were performed under ultrasonographic guidance with real-time guidance accounting for at least 57% in 2007 (Table 5.5.1). When incomplete data are censored, ultrasonographic guidance with real-time renal allograft biopsy accounts for 84% in 2007 (Figure 5.5.1).

Table 5.5.1: Biopsy method, 2004-2007

Method	2004		2005		2006		2007		Total	
	n	%	n	%	n	%	n	%	n	%
Blind (no ultrasound biopsy)	0	0	1	1	1	1	1	1	3	1
USS guided: real-time	45	86	26	37	62	54	54	57	187	56
USS guided: not real-time	2	4	32	46	33	28	9	9	76	23
Missing*	5	10	11	16	20	17	31	33	67	20
Total	**52**	**100**	**70**	**100**	**116**	**100**	**95**	**100**	**333**	**100**

* Missing means no data on biopsy technique

Figure 5.5.1: Biopsy method (censored for missing data), 2004-2007

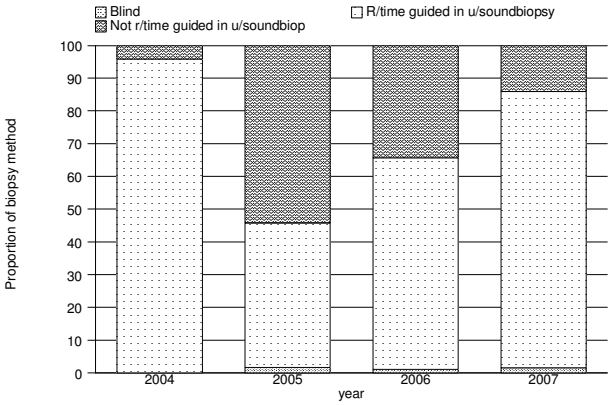
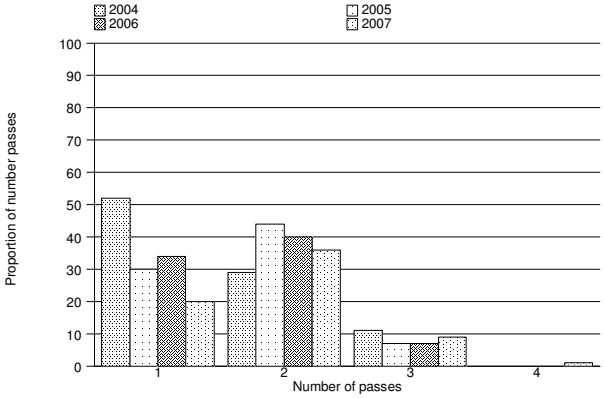


Figure 5.5.2: Number of passes, 2004-2007



5.5.2: Number of passes

The average passes for renal allograft biopsy remained unchanged over the last 4 years. In 2007, the average passes made during allograft biopsy was 1.87 (after censoring incomplete data) with only 1% requiring more than 3 passes (Table & Figure 5.5.2).

Table 5.5.2: Number of passes, 2004-2007

Number of passes	2004		2005		2006		2007		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
1	27	52	21	30	39	33	19	20	106	32
2	15	29	31	44	46	40	34	36	126	38
3	6	11	5	7	8	7	9	9	28	8
4	0	0	0	0	0	0	1	1	1	0
Missing*	4	8	13	19	23	20	32	34	72	22
Total	**52**	**100**	**70**	**100**	**116**	**100**	**95**	**100**	**333**	**100**

* No data information on number of passes

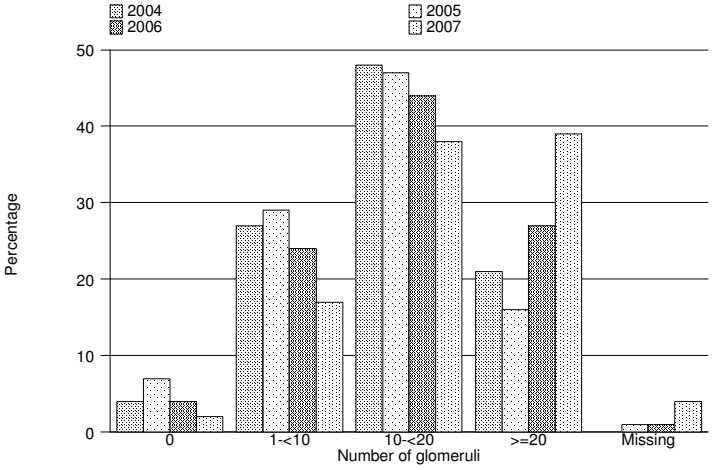
5.5.3: Number of glomeruli obtained on biopsy

With an average of less than 2 passes made, 71% of the renal allograft biopsies performed over the last 4 years yield at least 10 glomeruli (Table & Figure 5.5.3). Renal allograft biopsy without any glomerulus is uncommon and accounted for only 4%. Over the last 4 years, the number of renal allograft biopsies yielding less than 10 glomeruli has gradually decreased and in 2007 accounted for only 19%.

Table 5.5.3: Number of glomeruli obtained on biopsy, 2004-2007

No of glomeruli obtained	2004		2005		2006		2007		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
0	2	4	5	7	5	4	2	2	14	4
1-9	14	27	20	29	28	24	16	17	78	23
10-19	25	48	33	47	51	44	36	38	145	44
>20	11	21	11	16	31	27	37	39	90	27
Missing/Unknown*	0	0	1	1	1	1	4	4	6	2
Total	**52**	**100**	**70**	**100**	**116**	**100**	**95**	**100**	**333**	**100**

Figure 5.5.3: Number of glomeruli obtained on biopsy, 2004-2007



5.5.4: Type of complications

Complication rates from renal allograft biopsy were uncommon and major complications occurred in less than 2% of all allograft biopsies (Table 5.5.4).

Table 5.5.4: Type of complications, 2004-2007

Type of complications	2004		2005		2006		2007		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
No complication	35	67	51	74	92	79	54	57	232	70
Mild complication[a]	1	2	1	1	1	1	3	3	6	2
Severe complication[b]	0	0	1	1	0	0	1	1	2	1
Missing / Unknown[c]	16	31	17	24	23	20	37	39	93	27
Total	**52**	**100**	**70**	**100**	**116**	**100**	**95**	**100**	**333**	**100**

[a] Mild complication is defined as presence of gross haematuria, peri-renal collection, hematoma, or AVM that do not require intervention

[b] Severe complication is defined as presence of hypotension or complications requiring intervention.

[c] No data information for complications

5.6: Histological diagnosis

Acute rejection (acute and borderline) has remained the most common histological diagnosis of renal allograft biopsies over the last 4 years (Table 5.6), accounting for 31-34% of all allograft biopsies. During the same period, both the absolute number and percentage of renal allograft biopsies having histological diagnosis of chronic allograft nephropathy have increased (14% in 2004 compared to 19% in 2006), reflecting the change in biopsy indications among nephrologists.

Table 5.6: Histological diagnosis, 2004-2007

Histological Diagnosis	2004		2005		2006		2007		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Acute rejection	23	33	25	31	52	31	38	34	138	32
Borderline rejection	3	4	9	11	5	3	6	5	23	5
Calcineurine inhibitor toxicity	13	19	20	25	29	17	17	15	79	18
Chronic allograft nephropathy	10	14	12	15	37	22	21	19	80	19
Acute tubular necrosis	14	20	8	10	21	13	20	18	63	15
PTLD *	1	2	0	0	6	3	1	1	8	2
De novo GN	2	3	2	3	6	3	4	3	14	3
Recurrent GN	2	3	2	3	5	3	1	1	10	2
Diabetic nephropathy	0	0	0	0	5	3	1	1	6	1
Others	1	2	2	2	2	2	4	5	9	1
Total	**69**	**100**	**80**	**100**	**168**	**100**	**113**	**100**	**430**	**100**

*Post Transplant Lymphoproliferative Disease
Patients may have more than 1 diagnosis classification

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