Surgery in the renal transplant patient
## Prevalence of renal transplants in Australia

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>19950 (863)</td>
<td>20792 (915)</td>
<td>21487 (929)</td>
<td>22285 (960)</td>
<td>23012 (968)</td>
</tr>
<tr>
<td></td>
<td>Transplant</td>
<td>8865 (397)</td>
<td>9263 (408)</td>
<td>9556 (418)</td>
<td>10083 (430)</td>
<td>10551 (444)</td>
</tr>
<tr>
<td></td>
<td>Dialysis</td>
<td>11085 (496)</td>
<td>11529 (507)</td>
<td>11831 (512)</td>
<td>12202 (520)</td>
<td>12461 (524)</td>
</tr>
<tr>
<td></td>
<td>- Proportion home</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>- Proportion satellite HD</td>
<td>50%</td>
<td>49%</td>
<td>49%</td>
<td>48%</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>- Proportion PD</td>
<td>19%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
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</table>
## Prevalence according to State/Territory

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Transplant</th>
<th>Transplant</th>
<th>Transplant</th>
<th>Transplant</th>
<th>Transplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>QLD</td>
<td>1721 (384)</td>
<td>1800 (394)</td>
<td>1866 (401)</td>
<td>1923 (407)</td>
<td>1977 (414)</td>
</tr>
<tr>
<td>NSW</td>
<td>2495 (346)</td>
<td>2586 (354)</td>
<td>2692 (363)</td>
<td>2837 (378)</td>
<td>3004 (394)</td>
</tr>
<tr>
<td>ACT</td>
<td>218 (592)</td>
<td>235 (626)</td>
<td>238 (625)</td>
<td>239 (620)</td>
<td>251 (642)</td>
</tr>
<tr>
<td>VIC</td>
<td>2363 (427)</td>
<td>2495 (443)</td>
<td>2645 (461)</td>
<td>2833 (485)</td>
<td>2976 (501)</td>
</tr>
<tr>
<td>TAS</td>
<td>221 (432)</td>
<td>228 (445)</td>
<td>225 (439)</td>
<td>221 (429)</td>
<td>236 (457)</td>
</tr>
<tr>
<td>SA</td>
<td>919 (560)</td>
<td>949 (573)</td>
<td>965 (578)</td>
<td>974 (578)</td>
<td>1007 (593)</td>
</tr>
<tr>
<td>NT</td>
<td>69 (298)</td>
<td>82 (348)</td>
<td>87 (359)</td>
<td>98 (402)</td>
<td>102 (417)</td>
</tr>
<tr>
<td>WA</td>
<td>859 (365)</td>
<td>888 (364)</td>
<td>938 (373)</td>
<td>958 (374)</td>
<td>998 (385)</td>
</tr>
<tr>
<td><strong>Aust</strong></td>
<td>8865 (397)</td>
<td>9263 (408)</td>
<td>9656 (418)</td>
<td>10083 (430)</td>
<td>10551 (444)</td>
</tr>
</tbody>
</table>
Overall patient and graft survival following renal transplantation: short term
Overall patient and graft survival following renal transplantation: long term

Figure 8.17
Primary deceased donor grafts
Patient survival - Australia and New Zealand

Figure 8.18
Primary deceased donor grafts
Graft survival - Australia and New Zealand

Epworth
Important patient factors

Transplant patients have a high cardiovascular risk and higher cardiovascular event rate
Patients have a higher overall infection risk
Patients at risk of steroid myopathy if on “high” dose
Increased risk of acute kidney injury
Medication factors

mTOR inhibitors are associated with impaired wound healing

Changes to medication put the patients at risk of rejection

Tacrolimus/cyclosporine effected by inhibitors/enhancers of CYP450 system
Patient factors: Cardiac disease
Patient factors: infection

Renal transplant patients undergoing CABGS have an infectious complication rate of 10-20%

Review of 1939 patients after renal transplantation revealed wound infection in 7.5%, with most being superficial. Obesity and diabetes remain strong risk factors.
Hypogammaglobulinaemia is common

*Am J Transplant.* 2013 Oct;13(10):2601-10

Meta-analysis of 1756 solid organ transplants with IgG levels at one year

- IgG < 700mg/l  
  40%
- IgG < 400mg/l  
  15%

OR Respiratory infection 4.83 if IgG < 400mg/l
Hypogammaglobulinaemia in renal transplants

Small number of studies show no benefit in giving IVIG prophylaxis in the absence of recurrent infections

Patients with recurrent infections and IgG < 400mg/l may be treated with IVIG
Patient factors: increased risk of acute kidney injury


Animal models reveal a loss of autoregulation of renal blood flow after transplant

Tacrolimus associated with arteriolosclerosis

Many will have renal impairment and be on angiotensin blockade
Wound-healing is impaired after kidney transplantation with mTOR inhibitors


RCT of tacrolimus vs sirolimus

59 Tacrolimus 8% wound complications

64 Sirolimus 47% wound complication

35% if BMI < 30
Wound-healing is impaired after kidney transplantation with mTOR inhibitors

Impaired wound healing is influenced by:
- mTOR inhibitor dose
- prednisolone
- patients overall risk

Non-obese patient on low dose of both mTOR and prednisolone is low risk

May consider mTOR switch in a high risk patient
<table>
<thead>
<tr>
<th>Year Trans-</th>
<th>AZA</th>
<th>CYC</th>
<th>TAG</th>
<th>MMF</th>
<th>MPA</th>
<th>SIR</th>
<th>EVE</th>
<th>PRE</th>
<th>Number of</th>
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</thead>
<tbody>
<tr>
<td>2008</td>
<td>20 (6%)</td>
<td>80 (23%)</td>
<td>238 (68%)</td>
<td>275 (79%)</td>
<td>39 (11%)</td>
<td>12 (3%)</td>
<td>9 (3%)</td>
<td>324 (93%)</td>
<td>350</td>
</tr>
<tr>
<td>2009</td>
<td>24 (7%)</td>
<td>40 (12%)</td>
<td>272 (79%)</td>
<td>252 (73%)</td>
<td>55 (16%)</td>
<td>20 (6%)</td>
<td>11 (3%)</td>
<td>329 (96%)</td>
<td>344</td>
</tr>
<tr>
<td>2010</td>
<td>25 (6%)</td>
<td>48 (11%)</td>
<td>344 (79%)</td>
<td>305 (70%)</td>
<td>79 (18%)</td>
<td>21 (5%)</td>
<td>14 (3%)</td>
<td>411 (94%)</td>
<td>435</td>
</tr>
<tr>
<td>2011</td>
<td>31 (7%)</td>
<td>33 (7%)</td>
<td>356 (84%)</td>
<td>193 (42%)</td>
<td>208 (44%)</td>
<td>8 (2%)</td>
<td>20 (4%)</td>
<td>443 (94%)</td>
<td>470</td>
</tr>
<tr>
<td>2012</td>
<td>26 (5%)</td>
<td>22 (4%)</td>
<td>411 (64%)</td>
<td>203 (41%)</td>
<td>215 (44%)</td>
<td>11 (2%)</td>
<td>19 (4%)</td>
<td>450 (92%)</td>
<td>491</td>
</tr>
<tr>
<td>2013</td>
<td>19 (4%)</td>
<td>19 (4%)</td>
<td>420 (51%)</td>
<td>248 (48%)</td>
<td>175 (34%)</td>
<td>12 (2%)</td>
<td>7 (1%)</td>
<td>453 (87%)</td>
<td>518</td>
</tr>
</tbody>
</table>
Typical regimen in a renal transplant patient

- Mycophenolate 500mg bd
- Tacrolimus bd; according to blood levels
- Prednisolone 5mg/day
Clinical Scenario 1

• 65 year old man having hip replacement for avascular necrosis of the hip. He received a transplant 2007, having had glomerulonephritis. He is well, without symptoms of heart disease. He takes mycophenolate, tacrolimus, and prednisolone 5mg/d. He also takes irbesartan and atorvastatin. His creatinine is 150 micromol/l, and Hb is 128.

• Withhold irbesartan the day of surgery
• Hydrocortisone intraoperatively
• Restart mycophenolate and tacrolimus that evening orally
Corticosteroids
For moderate stress procedures (total joint replacement), it is a good practice to provide:
1- Intra-operatively: Hydrocortisone 50 mg intravenously.
2- Postoperative day 1: Hydrocortisone 20 mg intravenously every 8 hours for 3 doses.
3- Postoperative day 2: return to preoperative Glucocorticoid dose or parenteral equivalent. The glucocorticoid target is 50 to 75 mg per day of Hydrocortisone equivalent for 1 or 2 days [3, 18].
Clinical Scenario 2

• 70 year old woman, with recurrent infections, on IVIG. Renal transplant 2012, T2DM, HT, creatinine 190. Takes mycophenolate, tacrolimus, prednisolone (5mg/d), Ramipril, and amlodipine. Having laparoscopic cholecystectomy

• Consider cardiac scan in pre-operative assessment

• Admit the day before withholding Ramipril and starting iv fluid

• Intraoperative hydrocortisone and continue post-operatively

• Commence iv mycophenolate and tacrolimus on the day of surgery
Summary

With pre-operative assessment and post-operative medication plan, well selected stable renal transplant patients can easily undergo surgery.

Standard patient factors such as obesity, chronic renal failure, diabetes and vascular comorbidities are of greater importance than transplant medication in terms of their peri-operative impact.

In patients where there is an expectation of being unable to take oral medication for more than 24 hours, intravenous transplant medication should be commenced postoperatively.

Sirolimus/Everolimus mainly associated with wound/operative complications in thoracotomy, or when mTOR and prednisolone are high dose. In the cases of cardiac surgery consider a switch to tacrolimus at the time of surgery.