

Kidney transplantation in Mongolia using effective and economical immunosuppression – a 3-year experience

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Each year, approximately 200 Mongolians are diagnosed with end-stage kidney failure in this sparsely populated country (population 2.7 million) which is approximately three times the size of France. In Mongolia the per capita GDP in 2008 was \$1649.

In 2006 a functioning haemodialysis unit was created in the capital Ulaanbataar and a kidney transplant team was formed who received intensive training at leading transplant centres in Bangkok and Wuhan, China, London and Helsinki. The Mongolian transplant team thus formed consisted of general and urological surgeons together with a nephrologist, anaesthetist, immunologist and ICU nurses. The first transplant took place on the 10 August 2006. Appropriate legislation was passed in 2008.

Between August 2006 and August 2009, 34 ethnic Mongolians received a kidney transplant. The main diseases were glomerulonephritis, pyelonephritis and diabetic nephropathy. In 31 of the operations the donor was either a sibling or a parent.

In four recipients the donors were two recently deceased accident cases following controlled cardiac arrest after next of kin permission [1].

All donors and recipients were CMV positive. All recipients received acyclovir prophylactically.

Immunosuppression

All recipients received i.v. alemtuzumab 30 mg (Campath1) preoperatively and on the 2nd postoperative day [2–4].

Monotherapy with either oral Cyclosporine for 29 patients (start dose 7 mg/kg/b.w. daily) or Tacrolimus for six patients (start dose 0.7 mg/kg b.w. began on the 3rd postoperative day) was given.

Maintenance of C2 and trough levels of cyclosporin after discharge was aimed at 700–1000 nmol/l and 100–150 ug/ml respectively. For tacrolimus, the trough level aim was 5–7 ng/ml.

As a result of the remote geographical location of some of the recipients, blood level control was difficult to achieve. Therefore in 13 patients (from *22 in chart 1 onwards) azathioprine 1.5 mg/kg/b.w. was added.

With the exception of patients treated for acute rejection, steroids were not used.

Results

Donor specific cytotoxic cross match was performed using standard techniques and was negative in all cases. Reactivity to the 91 lymphocyte panel was less than 10% (ELISA). A total of 35% of the recipients were 3/6 match or better.

The mean hospital stay for recipients was 17 ± 6 days. The mean stay for the related living donors was 11 ± 4 days. This was influenced by the geographical locations of the patients' home.

Five surgical complications required re-exploration. All grafts were salvaged but in four of these recipients creatinine levels have been 220–280 $\mu\text{mol/l}$ at 1 year. There were no urological complications.

There were seven diagnosed and treated acute rejections in the 34 recipients (21%).

As of August 2009, 32 of the 34 patients are alive. A total of 28 patients have life supporting graft function. The 1 year PS and GS was 94% and 80% respectively. The mean creatinine levels in this cohort at 6, 12, 24 and 36 months were 163 ± 84 , 157 ± 96 , 200 ± 73 and 256 ± 90 $\mu\text{mol/l}$.

There were no cases of CMV-disease.

The first post-transplant one-year average cost of immunosuppressive treatment was $\$4.864 \pm 820$. The average alemtuzumab cost was \$512 per patient.

For those living at a distance from the capital frequently in a nomadic lifestyle, haemodialysis is not available. CAPD is not available in Mongolia. Thus, kidney transplantation was confined to patients whose homes were in or close to Ulaanbataar and were receiving chronic haemodialysis.

We realise that PS and GS are significantly lower compared with results from established centres. In addition to the expected learning curve, the distances involved and the nomadic lifestyle which pertains to a significant proportion of our patients are factors we believe have played their part.

Those in the upper echelons of earning power in Mongolia frequently sought and received treatment in China.

The Mongolian transplant program has features which distinguish it from its neighbours. Primarily, there is no commercial factor involved in the donation of kidneys either from relatives or deceased donors. Living donors are closely genetically related to the recipients.

Properly coded legislation controls the removal of organs from recently deceased donors with full written consent from next of kin. At the present time these are from donors after cardiac arrest in a controlled operating theatre environment. After transplantation the cost of immunosuppressive therapy is paid by the Ministry of Health.

The improvement in the quality of life following a successful kidney transplant was amply demonstrated by the enthusiasm and athletic achievement of the participants at the 1st Mongolian Transplant Games in August 2008 (photo 2) which was opened by the President of Mongolia.

We conclude that the use of Campath 1 together with a nonsteroid maintenance immunosuppressive regimen provides both economic and acceptable graft and patient survival in a developing country.

Conflicts of interest

The authors have declared no conflict of interest.

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