renal artery stenoses or renal artery stenosis in a solitary kidney is now well established.^{2,5} This ability to unmask significant renal artery stenosis when combined with ⁹⁹Tc-diethylenetriaminepentaacetic acid scanning may prove to be a useful diagnostic tool.⁷ Angiography remains the diagnostic investigation of choice, however, but in this group of high risk patients it may be associated with substantial morbidity and, indeed, mortality.⁵

Any discussion of treatment options must take account of the fact that these patients invariably have advanced generalised atherosclerotic disease, so that treatment of any kind carries a high risk.³ Revascularisation can be achieved by percutaneous transluminal angioplasty or by reconstructive vascular surgery. Angioplasty gives satisfactory results in medial hyperplasia but has proved disappointing in atherosclerotic lesions, particularly the most frequently occurring one, which is at the ostium of the renal artery.^{2,8} Furthermore, even after successful dilatation there may be permanent damage to the renal parenchyma from injection of contrast medium into the ischaemic kidney during the procedure.⁹

Reconstructive surgery for preserving renal function has been performed for many years by using several operative approaches.¹⁰⁻¹³ Initially, mortality was high, but more recently the Cleveland Clinic has reported a series of 51 patients with no perioperative mortality—but in whom any coronary or carotid lesions were repaired before the renal surgery.^{14,15} An attractive alternative operative approach is by revascularisation from the hepatic or splenic arteries, thus avoiding aortic cross clamping. Good success rates with low morbidity and mortality have been reported.¹⁶

Surgery is mostly carried out in patients with renal artery stenosis, but renal function that has been lost for weeks owing to complete occlusion may also be retrieved by reconstruction.¹⁷ Nor should a history of pulmonary oedema be regarded as a contraindication for revascularisation by either angioplasty or surgery; there seems to be a specific association between renal vascular disease and pulmonary oedema, which may in fact be cured by this approach.¹⁸ Revascularisation is therefore a most reasonable goal in this group of patients, who are generally at high risk and in whom renal dialysis is not an attractive or feasible alternative. The excellent results cited have, however, been reported from centres of excellence with a high throughflow of these patients, and common sense suggests that morbidity and mortality will be much higher in centres with less experience and skill.

Management policies seem to vary, but patients with mild to moderate renal failure are generally managed conservatively with frequent monitoring of renal function. Revascularisation is recommended for those with severe or rapidly progressing renal failure or if there is pulmonary oedema. The place of angioplasty is controversial, but our experience and that of others has led us to advocate angioplasty only for non-ostial stenoses. Unfortunately, we find that ostial lesions are by far the most common and in these cases recommend surgical revascularisation from the splenic or hepatic arteries.

Clearly the recent introduction of angiotensin converting enzyme inhibitors has led to the more frequent recognition of atherosclerotic renovascular disease as a common clinical entity—and a challenging management problem in our growing elderly population.

J E SCOBLE
Senior Registrar, Renal Unit

G HAMILTON
Consultant Surgeon

Royal Free Hospital and School of Medicine,
London NW3 2QG

- 1 Vaughan ED. Renovascular hypertension. *Kidney Int* 1985;27:811-27.
- 2 Jacobson HR. Ischemic renal disease: an overlooked clinical entity? *Kidney Int* 1988;34:729-43.
- 3 Wollenweber J, Sheps SG, Davis GD. Clinical course of atherosclerotic renovascular disease. *Am J Med* 1968;21:60-70.
- 4 Schreiber MJ, Pohl MA, Novick AC. The natural history of atherosclerotic and fibrous renal artery disease. *Urol Clin North Am* 1984;11:383-92.
- 5 Scoble JE, Maher ER, Hamilton G, Dick R, Sweny P, Moorhead JF. Atherosclerotic renovascular disease causing renal impairment—a case for treatment. *Clin Nephrol* 1989;31:119-22.
- 6 Ying CY, Tift CP, Garvas H, Chobanian AV. Renal revascularisation in the azotemic hypertensive patient resistant to therapy. *N Engl J Med* 1984;311:1070-5.
- 7 Maher ER, Otham S, Frankel AH, Sweny P, Moorhead JF, Hilsen AJW. Captopril-enhanced ⁹⁹Tc DTPA scintigraphy in the detection of renal artery stenosis. *Nephrol Dial Transplant* 1988;3:608-11.
- 8 Dean RH, Callis JT, Smith BM, Meacham PW. Failed percutaneous transluminal renal angioplasty: experience with lesions requiring operative intervention. *J Vasc Surg* 1987;6:301-7.
- 9 Weibull H, Tornqvist C, Bergqvist D, et al. Reversible renal insufficiency after percutaneous transluminal angioplasty (PTA) of renal artery stenosis. *Acta Chir Scand* 1984;150:295-300.
- 10 Sheil AGR, May J, Stokes GS, Johnson JR, Tiller DJ, Stewart JH. Reversal of renal failure by revascularisation of kidneys with thrombosed renal arteries. *Lancet* 1973;ii:865-6.
- 11 Wasser WG, Krakoff LR, Haimov M, Glabman S, Mitty HA. Restoration of renal function after bilateral renal artery occlusion. *Arch Intern Med* 1981;141:1647-51.
- 12 Baird RJ, Yendt ER, Firor WB. Anuria due to acute occlusion of the artery to a solitary kidney. *N Engl J Med* 1965;272:1012-4.
- 13 Morris GC, DeBakey ME, Cooley DA. Surgical treatment of renal failure of renovascular origin. *JAMA* 1962;182:113-6.
- 14 Bengtsson U, Bergqvist S-E, Norback B. Surgical treatment of renal artery stenosis with impending uremia. *Clin Nephrol* 1974;2:222-9.
- 15 Novick AC, Pohl MA, Schreiber M, Gifford RY, Vidt DG. Revascularisation for preservation of renal function in patients with atherosclerotic renovascular disease. *J Urol* 1983;129:907-11.
- 16 Moncre AC, Brewster DC, Darling RC, Atnip RG, Newton WD, Abbott WM. Use of the splenic and hepatic arteries for renal revascularisation. *J Vasc Surg* 1986;3:196-203.
- 17 Bergqvist S-E, Bergqvist D, Weibull H. Changing concepts in renovascular surgery. *Br J Surg* 1989;76:429-30.
- 18 Pickering TG, Devereux RB, James GD, et al. Recurrent pulmonary oedema in hypertension due to bilateral renal artery stenosis: treatment by angioplasty or surgical revascularisation. *Lancet* 1988;iii:551-2.

Oocyte donation

Ethical rather than practical problems need to be solved

Oocyte donation is a simple technique,¹ newer than semen or embryo donation,²⁻⁴ that offers a chance of pregnancy to selected infertile women. Despite its simplicity, however, it is underused, partly because oocytes are inherently harder to donate than semen, and thus donors are harder to find, and partly because oocyte donation lies in a legal grey area. Furthermore, some exciting recent work on primordial follicle donation may soon make oocyte donation unnecessary. But in the meantime it is not being offered to many women who could benefit.

The main group of women who can benefit are those with autoimmune or idiopathic ovarian failure (about 1% of infertile women).⁵ Others include women with gonadal dysgenesis (1 in 10 000 births) and those whose ovaries have been put out of action by surgery, radiotherapy, or chemotherapy.⁶⁻¹² Oocyte donation may also help older women with reduced oocyte quality, and rare uses are to circumvent genetic disease with X linked conditions and for couples refusing donor semen. Oocyte donation is not, however, needed for in vitro fertilisation in women in whom pelvic adhesions prevent laparoscopy; their oocytes may be recovered from the vagina.¹³

Clinically, oocyte donation is simple.^{6-12,14,15} Steroid regimens are now well established for endometrial control,¹⁴⁻¹⁶ and have already proved successful for the transfer of frozen-thawed embryos.¹⁷ Most centres stimulate the development of several follicles in the donor, synchronising cycles to allow embryo transfer during the recipient's "implantation window." Treatment with gonadotrophin releasing hormone analogues increases the number of oocytes,¹⁸ and when the long cycle protocol is used stimulation with gonadotrophin can be delayed until the recipient's cycle synchronises. Alternatively, the luteal phase of either woman can be lengthened with progestogens.^{19,20} The oocytes may then be

fertilised and the embryos transferred through the cervix or fallopian tubes, or gamete intrafallopian transfer may be used.²¹ Agonadal women require endocrine support with progesterone and oestradiol until the luteoplacental shift at 50-60 days, but most units give supraphysiological doses of both hormones for longer.²² At term the absence of ovarian relaxin may impair cervical ripening and a caesarean section may be necessary.¹¹

Given that the technical problems have largely been solved, the main problem is finding donors.^{23,24} Indeed, such is the shortage that there has been concern that women undergoing sterilisation are being pressured into donating oocytes.²⁵ Some units pay donors,²⁶ but most donors are friends, family members, volunteers, women about to be sterilised, or those with surplus oocytes after in vitro fertilisation. Now that embryos can be cryopreserved, however, the last group has virtually disappeared because most couples request fertilisation of all oocytes. Couples seem to find siblings more acceptable as donors for oocytes than for semen,²⁷ but the United Kingdom Interim Licensing Authority prefers donors to be anonymous. It will agree to known donors if there is no alternative and if the donor, the recipient, and their partners all receive independent counselling. Oocyte donors seem more interested in having contact with the progeny than do semen donors.^{28,29}

Freezing oocytes would help with supply, but, although normal babies have resulted, freezing could damage the meiotic spindle.^{30,31} Research is urgently needed to establish the safety of using embryos from frozen-thawed oocytes.

In theory, donation of oocytes should parallel donation of semen, but there are important differences.^{28,32} Oocyte donation inevitably requires the donor to undergo the inconvenience and potential hazards of ovarian stimulation and oocyte recovery. As in vitro fertilisation for male infertility has been criticised on these grounds³³ there must be the same objection to oocyte donation. Ultrasound guided recovery of oocytes has now removed the hazards of general anaesthesia and

laparoscopy for healthy volunteers.¹³ If ultrasonic oocyte recovery were performed during natural cycles oocyte donation would become as straightforward as bone marrow donation.³⁴ Any donation may infect the recipient; quarantining would require freezing—but freezing has not yet been shown to be safe for the eventual embryo.

The legal aspects of oocyte donation have hardly been tackled. Who are the parents? Most countries have no laws yet.³⁵ Once enacted, the Human Fertilisation and Embryology Bill will remove some anomalies, as earlier legislation did for semen donation. Strict Jewish law suggests that any child is the donor's, taking her religion; but to prevent adultery (for which divorce is mandatory) only semen from the donor's husband can be used, so single donors are preferred.³⁶ Sharia (Moslem law) gives the child the father's religion and prefers oocytes from one of his other wives, but if there are no other wives oocytes from Moslem, Jewish, or Christian women suffice.³⁶

Soon, conventional oocyte donation may be unnecessary. Ovulation and pregnancy have followed primordial follicle donation in mice,³⁷ and pregnancy has followed fertilisation of oocytes from unprimed ovarian biopsy specimens (K Y Cha *et al*, 45th annual meeting of the American Fertility Society, 1989). Fetal ovaries are a potential source of oocytes.

For the present, however, oocyte donation remains an effective technique. Regrettably, as well as being underused generally, in practice it is not available at all to some couples—namely, those from ethnic minorities and those with low disposable incomes. Titmuss argued that blood donation should be based on a gift relationship through the National Health Service³⁸; in Britain today oocyte donation is invariably performed in the private sector.

PETER BROMWICH

Medical Director,
Midland Fertility Services,
Little Aston Hospital,
Sutton Coldfield,
West Midlands B74 3UP

- Lutjen P, Trounson A, Leeton J, Findlay J, Wood C, Renou P. The establishment and maintenance of pregnancy using in vitro fertilization and embryo donation in a patient with primary ovarian failure. *Nature* 1984;307:174-5.
- Heape W. Preliminary note on the transplantation and growth of mammalian ova within a uterine foster-mother. *Proceedings of the Royal Society of London* 1890;48:457-8.
- Trounson A, Leeton J, Besanko M, Wood C, Conti A. Pregnancy established in an infertile patient after transfer of a donated embryo fertilised in vitro. *Br Med J* 1983;286:835-8.
- Buster JE, Bustillo M, Thornycroft I, *et al*. Non-surgical transfer of an in-vivo fertilised donated ovum to an infertile patient. *Lancet* 1983;i:816-7.
- Surrey ES, Cedars MI. The effect of gonadotropin suppression on the induction of ovulation in premature ovarian failure patients. *Fertil Steril* 1989;52:36-41.
- Lümtjen PJ, Leeton JF, Findlay JK. Oocyte and embryo donation in IVF programmes. *Clin Obstet Gynecol* 1985;12:799-813.
- Schenker JG. Ovum donation. The state of the art. *Ann NY Acad Sci* 1988;541:742-54.
- Rosenwaks Z, Navot D, Veeck L, *et al*. Oocyte donation. The Norfolk program. *Ann NY Acad Sci* 1988;541:728-41.
- Rosenwaks Z. Donor eggs: their application in modern reproductive technologies. *Fertil Steril* 1987;47:895-909.
- Devroey P, Camus M, Van Den Abbeel E, Van Waesberghe L, Wisanto A, Van Steirteghem AC. Establishment of 22 pregnancies after oocyte and embryo donation. *Br J Obstet Gynaecol* 1989;96:900-6.
- Rogers PAW, Leeton J, Cameron IT, Murphy C, Healy DL, Lutjen P. Oocyte donation. In: Wood C, Trounson A, eds. *Clinical in vitro fertilization*. 2nd ed. Berlin: Springer-Verlag, 1989:143-54.
- Devroey P, Wisanto A, Camus M, *et al*. Oocyte donation in patients without ovarian function. *Hum Reprod* 1988;3:699-704.
- Barlow D, Bromwich P, Wiley M, *et al*. Transvaginal compared with transvesical ultrasonography for recovery of oocytes for in vitro fertilisation. *Br Med J* 1988;296:751.
- Serhal PF, Craft IL. Ovum donation—a simplified approach. *Fertil Steril* 1987;48:265-9.
- Navot D, Laufer N, Kopolovic J, *et al*. Artificially induced endometrial cycles and establishment of pregnancies in the absence of ovaries. *N Engl J Med* 1986;314:806-11.
- Serhal P, Craft I. Simplified treatment for ovum donation. *Lancet* 1987;i:687-8.
- Schmidt CL, de Ziegler D, Gagliardi CL, *et al*. Transfer of cryopreserved-thawed embryos: the natural cycle versus controlled preparation of the endometrium with gonadotrophin-releasing hormone agonist and exogenous estradiol and progesterone (GEEP). *Fertil Steril* 1989;52:609-16.
- Rutherford AJ, Subak-Sharpe RJ, Dawson KJ, Margara RA, Franks S, Winston RML. Improvement of in vitro fertilisation after treatment with busserelin, an agonist of luteinising hormone releasing hormone. *Br Med J* 1988;296:1765-8.
- Templeton A, Van Look P, Lumsden MA, *et al*. The recovery of pre-ovulatory oocytes using a fixed schedule of ovulation induction and follicle aspiration. *Br J Obstet Gynaecol* 1984;91:148-54.
- Braude PR, Bright MV, Douglas CP, *et al*. A regimen for obtaining mature human oocytes from donors for research into human fertilization in vitro. *Fertil Steril* 1984;42:34-8.
- Asch R, Balmaceda J, Ord T, *et al*. Oocyte donation and gamete intrafallopian transfer as treatment for premature ovarian failure. *Lancet* 1987;i:687.
- Csapo AI, Pulkkinen MO, Ruttner B, Sauvage JP, Wiest WG. The significance of the human corpus luteum in pregnancy maintenance. 1 Preliminary studies. *Am J Obstet Gynecol* 1972;112:1061-7.
- Leeton J, Caro C, Howlett D, Harman J. The search for donor eggs: a problem of supply and demand. *Clin Reprod Fertil* 1986;4:337-40.
- Feinman M, Barad D, Szegietvari I, Kaali SG. Availability of donated oocytes from an ambulatory sterilization program. *J Reprod Med* 1989;34:441-3.
- Anonymous. The GMC and medical ethics. *Br Med J* 1989;298:1380.
- Robertson JA. Ethical and legal issues in human egg donation. *Fertil Steril* 1989;52:353-63.
- Sauer MV, Rodi IA, Scrooc M, Bustillo M, Buster JE. Survey of attitudes regarding the use of siblings for gamete donation. *Fertil Steril* 1988;49:721-2.
- Leeton J, Harman J. Attitudes towards egg donation of thirty-four infertile women who donated during their in vitro fertilization treatment. *J In Vitro Fert Embryo Transfer* 1986;3:374-8.
- Walker A, Gregson S, McLaughlin E. Attitudes towards donor insemination—a post-Warnock survey. *Hum Reprod* 1987;2:745-50.
- Chen C. Pregnancy after human oocyte cryopreservation. *Lancet* 1986;i:884-6.
- Whittingham DG. Fertilization in vitro and development to term of unfertilized mouse oocytes previously stored at -196°C. *J Reprod Fert* 1977;49:89-94.
- Walters L. Human in vitro fertilization: a review of the ethical literature. *Hastings Center Report* 1979;9:23-43.
- Klein RD. Resistance: from the exploitation of in-fertility to an exploration of infertility. In: Klein RD, ed. *Infertility. Women speak out about their experiences of reproductive medicine*. London, Pandora Press, 1989:253-5.
- Foulot H, Ranoux C, Dubuisson J-B, Rambaud D, Aubriot F-X, Poirot C. In vitro fertilization without ovarian stimulation: a simplified protocol applied in 80 cycles. *Fertil Steril* 1989;52:617-21.
- De Parseval GD, Fagot-Largeault A. The status of artificially procreated children: international disparities. *Bioethics* 1988;2:136-50.
- Schenker JG. Jewish and Moslem aspects of in vitro fertilization and embryo transfer. *Ann NY Acad Sci* 1985;442:601-7.
- Godsen RG. Restitution of fertility in sterilized mice by transferring primordial ovarian follicles. *Hum Reprod* 1990;5:117-22.
- Titmuss RM. *The gift relationship. From human blood to social policy*. London. George Allen and Unwin, 1970.