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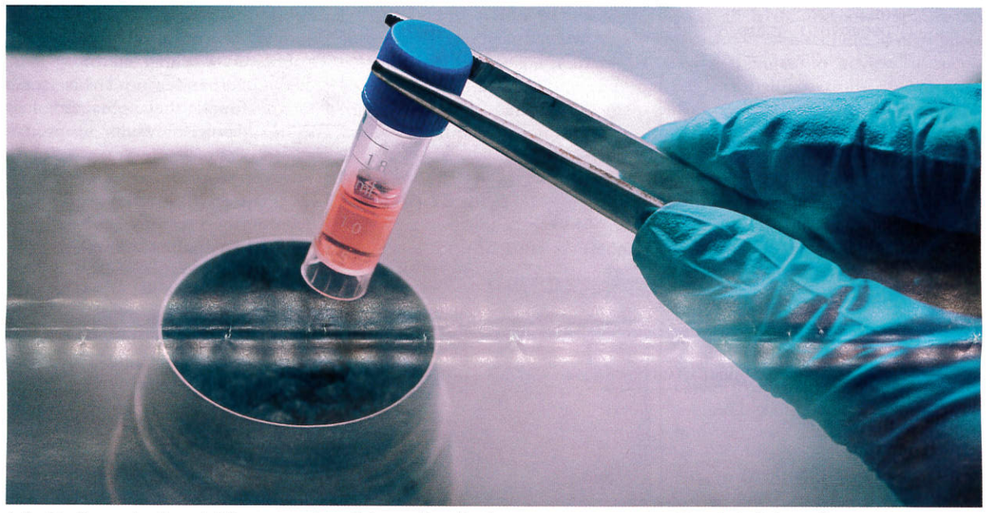
Social freezing on demand in the future

Report: Brigitte Dinkloh

Since 2006 around 100 centres that offer fertility preservation for cancer and non-cancer patients in Austria, Germany and Switzerland have joined forces to form the FertiPROTEKT network. This is affiliated with the FertiPROTEKT register, which documents the measures implemented to preserve fertility and the respective results achieved. Medical freezing, i.e. freezing of human germ cells or tissue, plays an important role in bringing the dream come true of having a baby at a later stage.



A liquid nitrogen bank containing suspension of stem cells cell culture

Medical freezing beats social freezing

About two years ago, when Apple and Facebook in the USA promised their female employees to cover the costs of literally putting their desire to have children on ice, this also started a heated discussion against the pros and cons of 'social freezing' (meaning freezing one's own eggs for insemination later in life) on this side of the Atlantic. Fact: Social freezing is now also possible in Europe, but the figures are a lot lower than for medical freezing. According to the register for Germany, Austria and Switzerland, there were 406 consultations for non-medical indications with 257 treatment cycles, with an average of 9.4 eggs per cycle being cryopreserved. This compares with 1,059 consultations carried out in 76 centres in the context of fertility protection for medical reasons, with 801 patients opting for treatment.

'Medical freezing in Germany is carried out in the context of FertiPROTEKT, whilst social freezing is clearly more controversial,' explains Professor Ludwig Kiesel MD, Director of the Department for Gynaecology and Obstetrics at Münster University Hospital and representative of the division of Reproductive Biology and Medicine at the German Society for Endocrinology, which held its 60th congress in Würzburg this March.

Indications for medical freezing

The most common indication for cryopreservation is breast cancer, followed by Hodgkin's lymphoma, leukaemia, and other cancers. Benign diseases, such as rheumatism or Turner syndrome play a subordinate role. A new guideline, which Kiesel helped to develop, therefore recommends that all oncology patients up to the age of 35 should receive advice on options for fertility protection. Currently there are many more cases of disease compared to the number of consultations and measures implemented for fertility preservation. 'The problem is that tumour treatment must often start at fairly short notice, and many colleagues literally forget to offer their patients advice. Egg harvesting can only be carried out once the patient has been receiving hormonal stimulation for two weeks, in the same way as is done in the context of assisted reproduction.

With cancer treatment imminent, there is little time and decisions must be made quickly. Most patients who do not yet have children, or only one child, express an interest in fertility preservation', the gynaecologist explains. According to the new guidelines, all oncology centres will now have to offer advice on fertility preservation based on clearly defined standards. In Germany there are around 100 of these centres and, if a medical professional does not have the required competence, the guidelines ensure that the patient receives advice through a cooperation partner – a procedure already implemented at Münster University Hospital. 'After all, cancer treatment is carried out in many medical fields and not just in gynaecology and urology,' the professor points out.

Vitrification

Cryopreservation provides the opportunity to harvest eggs as well as ovarian tissue, with around half the tissue from one ovary being removed at Münster University Hospital for this purpose. The tissue is flash frozen in the same way as fertilised or unfertilised eggs. Vitrification, i.e. flash freezing is particularly sensitive and durable procedure and better than its predecessors. Once the tumour has been treated successfully, and the patient would like to become pregnant, the cells or tissue can then be re-implanted.

'The patient should either have been free of the disease for a certain period of time or should be very apt at managing it. The tissue is re-implanted where it was removed. This should enable the patient to become pregnant naturally,' Kiesel explains. There are other measures for protecting the reproductive glands apart from cryopreservation. Medication can be administered, or the ovaries can be transposed. Even though these procedures may be more likely to attract funding from health insurers, Kiesel believes that cryopreservation is the safer method. However, whether or not

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Ludwig Kiesel MD PhD studied medicine at Ruprecht Karl University, Germany, and the Royal Free Hospital Medical School, London, UK. In 1981-82 he was a research fellow in Maryland, at the National Institutes of Health. After residency at Heidelberg University he joined Tübingen University and then chaired Obstetrics & Gynaecology at Münster University.

Kiesel is also a board member of the World Endometriosis Society, German Society of Gynaecological Endocrinology and German Society of Obstetrics and Gynaecology.

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Robotic-assisted visceral surgery

The advantages are obvious

Report: Brigitte Dinkloh

The implementation of minimally invasive technology in the 1990s was a milestone for visceral surgery. A further chapter of innovation began about five years ago with advances in robotics, which were able to address certain technological shortcomings of minimally invasive surgery in the fields of optics, instrument technology and reconstruction.

If nothing else, pancreatic surgery has benefitted from these developments. 'It ranks amongst the most complex interventions in abdominal surgery and opens up an important perspective to be able to offer these complicated and very time consuming interventions, which have been carried out almost exclusively with conventional surgery, with an assistance system and minimal invasion,' explains Colin M Krüger MD, Dipl.oec, Senior Consultant at the Department for Surgery, in Immanuel Hospital Rüdersdorf, near Berlin.

A lower rate of complications

First studies and analyses confirm that the quality of organ removal and partial removal is more or less comparable for both procedures, but also that the rate of complications associated with the intervention is significantly lower for minimally invasive procedures than for open surgery. Therefore, minimally invasive surgery, whilst achieving the same surgical outcome, has clear advantages.

But, which patients and indications are suitable for robotic surgery? 'Basically, all patients who are operable and fulfil the surgical entry criteria,' Krüger responds. 'If the diagnosis confirms that a patient is likely to benefit from surgery, then this can also be done with minimally invasive procedures, or, in the best case, with robotic surgery, such as the da Vinci Surgical System.'

Krüger does not foresee a considerably better perspective for patients with pancreatic cancer as 70-80% of them are only diagnosed once the tumour has already spread and is considered inoperable.

However, there are other pancreatic diseases with a less negative prognosis, where surgical intervention is worthwhile. These include hormone producing tumours, as well as all types of chronic pancreatitis such as those that may develop due to chronic alcohol abuse or as a result of autoimmune diseases, where the body tries to fight its own pancreatic tissue. The resulting inflammatory changes can cause jaundice, gastroparesis and, most importantly, chronic pain. This is an area of application for robot-assisted surgery.

Colin Krüger is establishing the first centre for robotic-assisted, visceral surgery in Rüdersdorf, near Berlin

Improved optics and a higher degree of freedom

One essential advantage of the da Vinci Surgical System is the improved visibility over the operating area. 'Unlike conventional laparoscopy, which only offers 2-D visualisation, it facilitates 3-D HD visualisation in the same way as open surgery does. The surgical structures can be enlarged up to tenfold, which means more precision during preparation,' the Berlin-based surgeon emphases.

The same applies to handling, with much more freedom when guiding the instruments in the abdomen compared to conventional laparoscopic surgery. "The instruments have up to seven degrees of freedom,' Krüger points out. 'When you work with double-joint technology the instruments carry out their own hand movements. This is the principle of the surgical robot – it controls the manipulators, and the hand movements carried out outside of the operating area are implemented 1:1 to the instrument working inside the abdomen. You sew externally, with the manipulator in your hands, and the robot sews with the needle, which you hold in the external needle holder, but inside the abdomen. This is brilliant.'

More 'radicality'

A further advantage of robot-assisted surgery in oncology is immunofluorescence. These fluorescent dyes, injected by the anaesthetist, can stain the lymphoid tissue or other vessels and structures during surgery, either to protect them or remove them even more precisely with the respective radicality. The prescribed number of lymph nodes to be removed for certain types of tumour surgery can be significantly increased with the da Vinci system. 'During open surgery, the dyeing is very complex because there isn't normally a camera system available, which is why it's not usually done.

'For a long time, it was quite controversial whether tumour surgery should actually be carried out with the minimally invasive procedure at all,' Krüger points out. 'There was always the claim that it is not sufficiently radical. However, this has been scientifically refuted. It obviously always depends on the expertise of the surgeon, but the procedure achieves at least the same, and sometimes even more radicality, and at the same time allows the patient to benefit from the advantages of minimally invasive surgery.'

Costs and viability

Only a few patients in Germany currently benefit from robotics in pancreatic surgery. Last year, 43 surgical departments had access to one of the 87 systems currently available in that country. The number of departments for visceral surgery and centres that treat a noteworthy number of patients with robotics is considerably lower still; Krüger estimates it to be around 10-15 centres.

This can most probably be attributed to the increased costs of the procedure, which are €1,000-€1,500 higher than the costs of conventional surgery and therefore still not always viable, despite shorter in-patient stays.

The discussion as to whether these systems are really required, or not, is still very heated and affected by jealousy. On the other hand, there are currently almost exclusively only studies that confirm the feasibility, and only very few studies that confirm a clinical advantage of robotics compared to minimally invasive surgery. 'However, this is to be expected at the moment, as we require a critical number of users and data to confirm clinical superiority. Method studies are difficult to carry out anyway, and often only individual parameters are examined. We don't generally compare the minimally invasive procedure with robotics, so it is difficult to evaluate this,' he explains.

Krüger is establishing the first centre for robotic-assisted visceral surgery in Brandenburg, and plans to carry out his own studies. With gynaecological and urological colleagues he aims to achieve full capacity for the da Vinci-SI with around 500-600 interventions annually in one to two years' time.

Financial easing could occur from 2018/19 when large manufacturers will break the current monopoly held by Intuitive by releasing their own equipment, and when competition will regulate the prices for acquisition and maintenance. Krüger is sure that 'in five years' time the costs will settle down around the level of those currently expected for a complex laparoscopy'.

In April 2017, **Dr Colin M Krüger MBA, Dipl.oec**, became a senior consultant at the Department for Surgery at the Immanuel Hospital, Rüdersdorf, near Berlin since April 2017. Earlier, as a specialist for general, visceral and vascular surgery and emergency medicine at Vivantes GmbH, he also headed the visceral surgery programme for 'Robot-assisted, minimally invasive Surgery (Da Vinci)'. From October 2016, he was senior consultant at the Centre for Robotics and Minimally Invasive Surgery in the Department for Surgery, Vivantes Humboldt Hospital, Berlin. Krüger also holds a Master of Business Administration in Health Economics, is a medical advisor at Intuitive Europe and is currently writing his habilitation at the University of Greifswald on the risk stratification in pancreatic surgery.

Led lamp to meet surgeon's needs

The right lighting of a surgical site is critical. Bologna-based lighting specialist firm ACEM confirms that the special optics of its LEDS in the firm's STARLED5 NX surgical lamp 'generate a shadowless, clear and homogeneous light, assuring visual comfort and best working conditions both for the surgeon and medical staff. Thanks to its next generation LEDs, the lamp can produce a perfect illumination under every condition generating an IR-free light, an excellent colour temperature and a practically endless life cycle at low consumptions.

'The 43 LEDs,' Acem continues, 'are circularly positioned and divided into five reflectors (with seven LEDs each) and another eight LEDs are radially placed around the handle. In this way, the lamp produces a high illumination level of 130.000 lux (160.000 lux optional) for a steady life cycle of about 50,000 hours.'

The firm's system ACRIS, with microprocessor, is reported to ensure control of electrical curves typical of LEDs to remain unaltered over the time, but maintaining a long life cycle.

'The colour rendering index of Starled5 NX is 95 and its colour temperature is 4,500 °K,' Acem adds. To meet various surgical needs, the system can produce focused and ambient light, with a 'light field focusing system adjusting the light spot diameter accurately assuring an excellent sharpness of details in the operating area'.

** Acem Medical Company is based in Bologna, Italy. www.acem.it e-contact and queries: Info@acem.it*

The Starled5 NX surgical lamp with LEDs provides surgical teams with shadowless, clear and homogenous light in the operation and surrounding area