Safe anesthesia – during transplantation surgery and other interventions

Japan’s ageing population represents a challenge to all branches of medicine. Therefore, reliable devices with corresponding monitoring technology are in demand in operating rooms. In the newly opened Perioperative Centre at the Toho University Omori Medical Center, reliance is placed on Dräger’s Perseus anaesthesia device and SmartPilot View technology.

Japan has the highest life expectancy worldwide. The task of providing medical care for this ageing society, which is increasingly suffering from various primary diseases, represents a challenge for the country. Anesthetists, too, are confronted with the task of being able to care for these patients as comprehensively and adequately as possible. In earlier days, they were exclusively concerned with the risks occurring in connection with surgery.

“Today, we are increasingly called upon to ensure comprehensive care for these multimorbid patients”, says Professor Ryoichi Ochiai, Head of the Department of Anesthesiology at the Toho University Omori Medical Center.

**BETTER PATIENT OUTCOME**

Modern technology is required in order to provide treatment for the numerous widely different health problems of a patient. Technical progress and cost-effectiveness are often indirectly related to each other. To give an example: “If we purchase a ventilation device that is less susceptible to failure, we will thereby better be able to guarantee our patients’ safety”, Ochiai continues. As a result, the device will be more advantageous economically – even if it may have been more expensive to purchase than products of other manufacturers. In the final analysis, the important thing is to influence the patients’ outcome as positively as possible.

**DRÄGER MEANS “TRUST”**

Since the beginning of his professional career as an anesthetist more than 30 years ago, Professor Ochiai has put his trust in Dräger devices.

“That company has a long tradition in the development and manufacture of anesthesia and ventilation devices; so I can be sure they know what they’re doing”, remarks the anesthesia expert. “If I were to summarise my experience with Dräger in one word, this word would doubtlessly be “trust”.”

For this reason, Professor Ochiai did not have to think twice about choosing the Omori Medical Center for surgery he had to undergo following a bicycle accident last year. The fact that the operating rooms of that hospital are equipped with Dräger anesthesia devices put his patient’s mind at ease.

**SPECIAL FOCUS ON TRANSPLANTATION**

The medical staff at the Omori Medical Center uses the Perseus anesthesia device, supplemented by visualisation of the progress of anesthesia with SmartPilot View (SPV). Both technologies play a major part during transplantation surgery, which is a key activity of the clinic. Perseus offers a fine-tuned concept for hemodynamic monitoring.

At your side in ...
SPV visualises complex effects of anesthetic agents and indicates both the current status and the progress of general anesthesia based on pharmacokinetic and dynamic models. Here, at the Omori Medical Center, says Ochiai, they even operate on patients, who would, because of their poor health condition and because of the associated secondary diseases, not be admitted for transplantation by other clinics. “Especially in the case of these patients we need to monitor the status of the anesthesia very closely”, confirms the chief physician. In addition, organ transplants in Japan often are from living donors. That is so to say, parents or close relatives donate organs for members of the family.

“Anesthetists are absolutely called upon to guarantee the medical safety of these healthy donors during the transplantation procedure.”

DIFFERENTIATION IN SIMULATION AND NAVIGATION
Anesthesiology has made huge progress over the last couple of years. Today, the devices differentiate themselves mainly with respect to simulation and navigation, the experienced anesthetist is convinced. SPV offers the possibility of graphical representation in the form of isoboles. This supports us in administering safe anesthesia to the patient”, comments Ochiai. The representation supports the induction as well as the maintenance and termination of anesthesia.

OR NURSING STAFF RESPONSIBLE FOR COMMISSIONING
“We are involved with the activities before, during and after surgery”, explains Manager of Nursing R.N. Michi Yoshida. Together with her colleagues, she is responsible, among other things, to check all the equipment in the operating room for proper functioning and for performing self-tests each morning. The Dräger Perseus is equipped with fully automated device test functionality for all relevant components. “This reduces time and effort for device preparation”, says the Manager of Nursing Yoshida. The time saved in this way is thus available for other tasks – such as looking after patients.

NURSING STAFF FOR THE BENEFIT OF THE PATIENT
Once again, Yoshida points out: To patients, surgery is not an everyday occurrence. They expect that their condition will improve after the operation. “It is our responsibility to fulfil this expectation – with the aid of anesthesia, among other things”, adds the senior nurse.

“Anesthesia is indispensable during surgery, serving to relieve pain and to sedate the patients. For this reason, not only the anesthetists, but also the OR nursing staff should have a firm understanding of the individual aspect of the procedure,” says Yoshida.

SAME ANESTHESIA SYSTEMS INS ALL OR’S
Since November 2014, all 18 operating rooms have been equipped with anesthesia devices and monitors of the same type. For reasons of safety, this is extremely important, explains the nursing expert. Particularly in cases of emergency, for example when vital supply lines are interrupted and switch-over to the oxygen cylinder attached to the rear must be made, the situation is alleviated by the uniform devices, the OP-specialist nurse is convinced. “In such a situation, if one had to figure out first how it is done for this or for that anesthesia device, life-saving treatment would be delayed!” To ensure that each movement is well rehearsed, the manufactures conduct training sessions and information events for newly introduced devices. “When Perseus was installed, all people that were going to be involved with it – nursing staff and anesthetists – were given one week’s time to try the device out and to familiarise themselves with it”, Yoshida remarks contentedly.
**PERSEUS INFLUENCES TRAINING**

However, not only anesthetists and OR-staff needed to adapt to the new situation. "The largest changes caused by the introduction of Perseus were experienced in the training", says Nobukazu Sato. In his capacity as Associate Professor in the Anesthesiology Department of the Omori Medical Center, he is responsible for the training of junior doctors.

According to Sato, the prediction function is one of the advantages Perseus offers in training. This function indicates how the oxygen concentration will tend to change if the concentration of the anesthetic agent is altered.

In addition, Perseus allows reading of the vapor setting, explains anesthetist Sato. Thus it is known how many minutes it will take till the effective anesthetic concentration is reached.

**VENTILATION OF CRITICALLY ILL PATIENTS**

The junior doctors themselves also appreciate the Perseus. With the devices that were used previously, it was only possible to administer PCV ventilation and to control the volume, says Dr Robert Takashi Sumner, resident in the Department of Anesthesiology in his fourth year of training. With Perseus, it is no longer necessary to attend to the pressure support and the like manually, since this is now done automatically, in tune with the patient’s respiration, Sumner explains. When working with that device he is thus able to carry out other tasks at the same time.

When junior doctors are instructed in low flow anesthesia it becomes apparent that especially young doctors erroneously believe that it is sufficient to reduce the fresh gas flow and subsequently keep the flow steady, remarks instructor Dr Sato. However, if the flow of fresh gas is substantially lower than the breathing minute volume, the oxygen concentration also decreases, so that it may be necessary to increase the oxygen concentration in the fresh gas. The same applies to the anesthetic concentration. "In order to be able to respond to situations of this kind, one should use anesthesia devices with high functionality", the anesthetist points out, making reference to the Dräger devices.

**ANESTHESIA SIMULATION WITH SMARTPILOT VIEW**

"In the past we used anesthesia simulators in the form of handhelds or computers. But that meant that all data had to be entered manually while anesthesia was induced", Sato adds.

Visualisation by means of SPV now allows users to perform simulations without additional work. When SPV is used, most values are automatically transmitted by the anesthesia device or the syringe pump, thus enabling simulation in real time.

This is precisely what is desired in the training of junior anesthetists: The idea is that the young anesthetists first gain confidence in monitoring and simulation, so that they will later, in the clinic, be able, founded on their own theoretical considerations, to induce well-conceived anesthesias that are based on theory and evidence. “During the training, junior doctors and medical specialists perform anesthesias together”, explains the experienced anesthetist.

**SMARTPILOT VIEW FOR THE UP-COMING GENERATION**

Especially young junior doctors and those who are open to new approaches, use SmartPilot View actively, says Sato. “The technology is very useful to create an understanding of the pharmacology under anesthesia.”

Thanks to SPV it is possible to determine, during surgery, the dose of the anesthetic agents, taking into account the effective concentration in the respective areas.
In addition, it is easier to understand the synergetic effects of anesthesia and sedation. Particularly young doctors who are not yet very well acquainted with performing anesthesia can see how deeply anesthetised the patient is at any given moment in time – and if and to what extent the dosing of the drugs should be changed. Visualisation by means of SPV thus has an important educational effect, adds the experienced instructor.

**PREDICTION OF THE PATIENT’S CONDITION**
Dr Yukiko Asano, resident in the Department of Anesthesiology and in the second year of training, has already gained experience with SmartPilot View: “My first impression of SmartPilot View was that it is very uncomplicated to use”, she says. “For example, it is possible to display, at the touch of a button, the current pharmacological status of the patient – and thus to predict the blood concentration of individual drugs.” But that is not all:

“In my view, the best thing about SmartPilot View is that it is possible during extubation to see how much anesthetic or analgesic remains in the patient.”

With the help of a reference value it is possible to assess whether the patient, given the current saturation with anesthetic agent, will feel pain when waking up or whether waking up will be easy or hard.

**LINK BETWEEN ICU AND OPERATION ROOM**
The tasks of anesthesiology are increasingly getting more specialised. “Although, as anesthetists, we are mainly responsible for anesthesia, we are increasingly taking on tasks in post-operative ventilation”, Sato explains. At the same time, the ventilation devices used in intensive care have become so much more sophisticated in recent years that an anesthetist who is able to induce an ordinary anesthesia is not necessarily capable any more of understanding the modern ventilation devices. “Therefore I hope that Dräger will develop more products that establish a close link between ICU and operating room.” The interface of Perseus is almost identical to the ventilation devices of the Evita and V500 series.
Professor Ryoichi Ochiai, Head of Department of Anesthesiology
Under the aegis of Professor Ryoichi Ochiai, the OR wing was completely refurbished at the end of 2006. “All specialists and all occupations involved with surgery are a functioning team”, the physician says. In Ochiai’s opinion, providing safe care for older, multimorbid patients represents a particular challenge: “The number of patients with a large number of primary diseases has risen.” For this reason, Ochiai equipped all OR’s with identical anesthesia devices and monitors in 2014. They all require the same handling, thus ensuring a greater degree of safety for the patients.

Dr Nobukazu Sato, Associate Professor, Department of Anesthesiology
Besides his work as anesthetist, Dr Nobukazu Sato oversees the training of young anesthetists. The physician is thus responsible for introducing the upcoming generation of doctors to new technologies in anesthesiology such as SmartPilot View. “Each anesthesia must be well-conceived, based on theory and evidence, and thus must be induced taking into account pharmacological effects”, Sato explains. SPV enables prospective anesthetists to perform safer anesthetics.

R.N. Michi Yoshida, Manager of Nursing
R.N. Michi Yoshida and her colleagues are responsible for making sure that patients have a feeling of being safe and in good hands before, during and after the intervention. “The patients expect that their condition will improve if they undergo surgery in our hospital. It is our task to look after them during the entire operation phase”, says Yoshida. “We employ the surgical safety checklist issued by the WHO to check patients’ safety from the moment they are wheeled into the OR until they come out of it. In this way we make sure that nothing is overlooked.”

Dr Robert Takashi Sumner, Resident, Department of Anesthesiology
Four years ago, Robert Sumner started his specialist medical training to become an anesthetist at the Omori Medical Center where he now has the role of chief resident. “My work at a university clinic provides me with the opportunity to try out the most recent developments in the field of anesthesiology.” These include modern anesthesia devices such as Perseus as well as new technology, for example SmartPilot View, which Sumner uses every day. As part of his training, the young physician works in all operative departments of the clinic.

Dr Yukiko Asano, Resident, Department of Anesthesiology
The physician is trained at the Omori Medical Center to become an anesthetist. For her, modern technologies are part everyday life: “A modern device helps me to improve my performance as an anesthetist”, says the prospective anesthetist. Both the device and the technology are uncomplicated to use. “At one flick of the wrist, SmartPilot View shows me the pharmacological status of the patient.” Dr Yukiko Asano uses this feature on a daily basis in the interests of the patients’ safety.
About the Hospital

The Toho University Omori Medical Center was founded in 1925. In Japan, it has the reputation of being a key hospital, particularly in the Jonan region. The hospital houses 948 beds in numerous branches of medicine. Performing transplantations is a key activity. Omori’s specialists even transplant patients who were rejected by other hospitals on the grounds of the severity of their condition. In 18 operating rooms, approximately 10,000 interventions are performed every year, including a large number of transplants and robotic surgical interventions. In addition to providing innovative treatment to patients, the Medical Center trains physicians and nurses and also conducts studies. The hospital is certified on a regular basis in order to maintain the high standards of medical treatment. Thus the clinic regularly achieves excellent results from the Japan Council for Quality Health Care (JCQHC) and the Council for Evaluation of Postgraduate Clinical Training (JCEP).