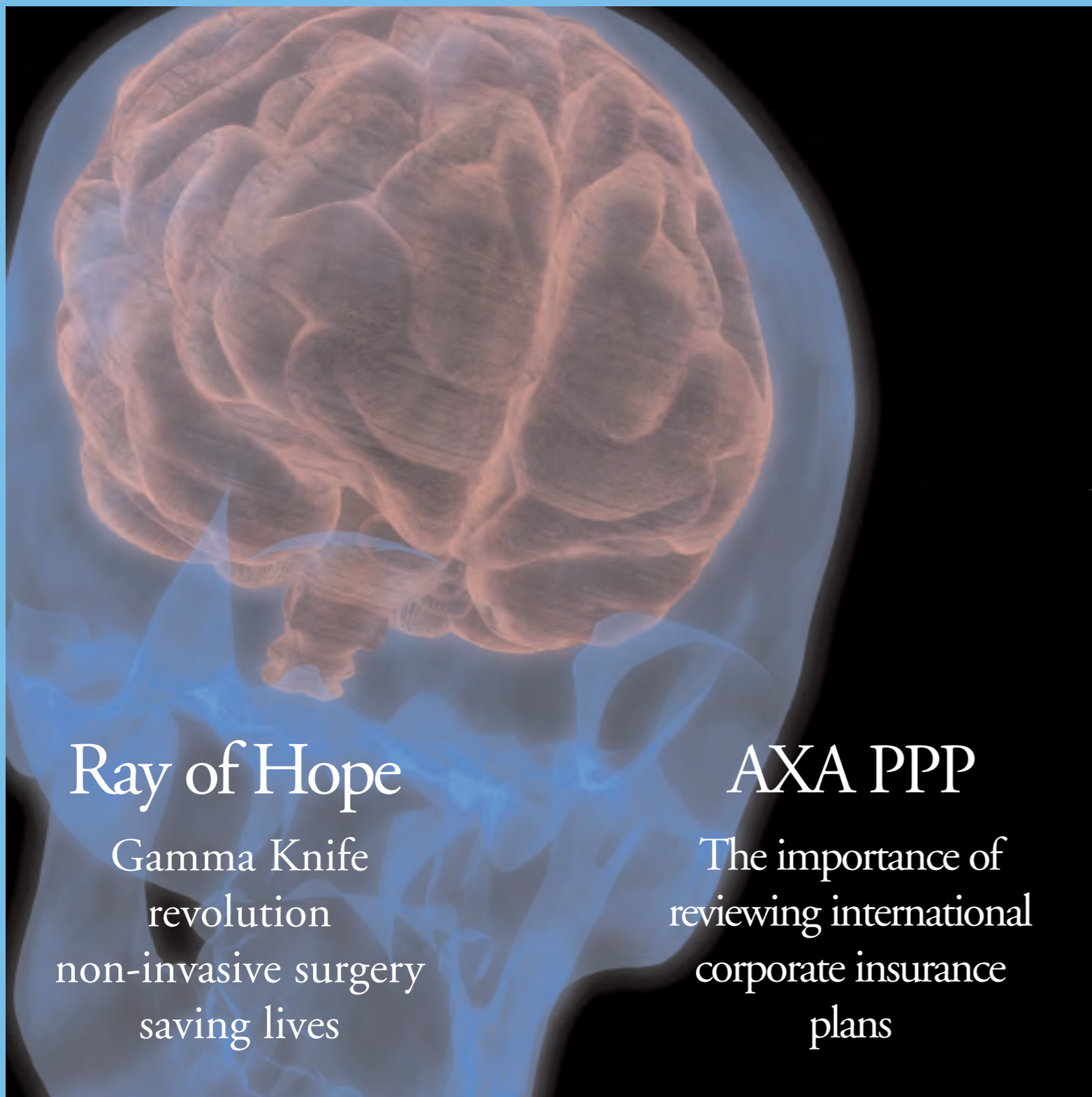


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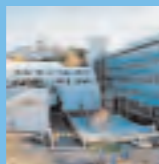
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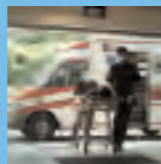
Healthcare International



For employers, simply appointing the right person to an international assignment is only half the problem... pg56



Hirslanden group of private hospitals has established itself as the leading provider of private medical quality in Switzerland. pg62



Case Study from Changi General, featuring Senior Consultant Gastroenterologist, Prof. Fock Kwong Ming. pg100

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Q&A

Gamma Knife Surgery

Patient awareness of Gamma Knife surgery has never been more acute and informed. HCI reports on the huge health tourism market potential of this procedure.

The Gamma Knife allows non-invasive cerebral surgery to be performed in one session, the same as neurosurgery with extreme precision, sparing tissues adjacent to the target. Based on preoperative radiological examinations, such as CT-scans, MR-scans, or angiography, the unit provides for highly accurate irradiation of deep-seated targets, using a multitude of collimated beams of ionizing radiation in scalpel like precision. Gamma Knife surgery represents a major advance in brain surgery, changing the landscape within the field of neurosurgery in the last decade.

Its development has enhanced neurosurgical treatments offered to patients with brain tumours and vascular malformations by providing a safe, accurate and reliable treatment option. Gamma Knife enables patients to undergo a non-invasive form of brain surgery without surgical risks, subsequent rehabilitation or a long hospital stay. Gamma Knife surgery is unique in that no surgical incision is made to expose the inside of the brain, thereby reducing the risk of surgical complications and eliminating the side effects and dangers of general anaesthesia. The "Blades" of the Gamma Knife are the beams of gamma radiation programmed to target the lesion at the point where they intersect. In a single treatment session, 201 beams of gamma radiation focus precisely on the lesion. Over time, most slowly decrease in size and dissolve. The exposure is brief and only the tissue being treated receives a significant radiation dose, while the surrounding tissue remains unharmed.

Developed in 1968 by Swedish Professor Lars Leksell, the Gamma Knife is an innovative and complex instrument designed for planning and delivering high doses of radiation to precise locations within the brain. It has proven highly effective in treating numerous neurological disorders, including arteriovenous malformations (AVMs), benign and malignant brain tumours, and trigeminal neuralgia. It's a revolutionary tool that allows neurosurgeons to operate on brain tumours, arteriovenous malformations, trigeminal neuralgia and other specific indications of the brain without making a single incision.

HCI sets the questions to two establishments that operate Gamma Knife radiosurgery; the Gamma Knife center of Klinik In Park in Zurich, of the Switzerland-based Hirslanden Group, and Germany-based GKS Munich.

Q&A

Dr Mindermann – Hirslanden, Zurich Gamma Knife Surgery



PD Dr. med. Thomas Mindermann is a Board Certified Neurosurgeon and since 2000 Medical Director of the Gamma Knife Center Zurich, Klinik Im Park, Zurich, Switzerland. He graduated from the Medical School at the University of Basel, Switzerland and specialized in Neurosurgery in Switzerland. He was a Senior Pituitary Research Fellow at the University of California, San Francisco and an Attending Neurosurgeon at the University Hospital of Basel. He received Habilitation (Associate Professorship) from the University of Basel and attended the Course in Gamma Knife Radiosurgery at the Karolinska Hospital, Stockholm. He is a member of several Swiss, American and international professional societies and the President of the Commission on Radiosurgery of the Swiss Society of Neurosurgery. Tel: + 41 (0) 44 209 22 9 Fax: + 41 (0) 44 201 51 66

Dr. Albertus Thomas C.J. van Eck, MD - Munich Gamma Knife



Born 24.02.1959 in the Netherlands, Dr Bert van Eck, MD Neurosurgeon and medical director of the Munich Gamma Knife. Dr. van Eck finished basic medical training at the University of Amsterdam and was trained as a neurosurgeon in Karlsruhe, southern Germany. Worked as registered neurosurgeon in Krefeld, Germany where he also got his two year training as Gamma knife radio-neurosurgeon.

Since July 2005 he is the medical director of the Munich Gamma Knife. As Quality manager of the three Gamma knife Centres in Munich, Krefeld and Frankfurt he supervises the ongoing processes of continuous improvement of Gamma Knife treatment in Germany. He firmly believes that the high quality of Treatment in these centres is not coincidental.

Tel: + 49 89 31 81040

The Gamma Knife is a long established procedure, and in many cases, the treatment is considered preferential over invasive neural surgery. So why is Gamma Knife surgery such a limited procedure in so many parts of the world?

Munich GK: Gamma Knife treatment is a limited procedure because of strict selection criteria. Radiosurgery does not cause an immediate volume reduction as microsurgery does. Many larger tumors cause symptoms because of their space occupying affect in the brain. For this reason microsurgery is preferred for the treatment of larger tumors. The side effect rate after Gamma Knife treatment depends on the total treatment volume. This also

causes restrictions on the tumour volume that can be treated. Many tumors like Glioblastoma show diffuse growths in the surrounding brain tissue which make them unsuitable as a radiosurgical target. Another very important reason is the fact that a 100% reliable histological diagnosis can only be assured with tumor tissue for microscopically evaluation. Because high quality radiosurgery requires a sophisticated medical infrastructure the implementation of radiosurgery is limited to the more developed areas of the world.

But even in highly developed countries like Germany there are political factors that interfere with the widespread accessibility to Gamma

Q&A

knife radiosurgery.

Zurich GK: Besides availability, it is mainly for health political reasons that Gamma Knife radiosurgery is a limited procedure in many parts of the world. Many government agencies and health insurances have not yet realized that Gamma Knife radiosurgery is much more cost effective than open surgery. In addition, Gamma Knife radiosurgery is by far the least inconvenient method for the patient with the least side effects.

Can you explain what the fundamental differences are between Radiosurgery and Radiotherapy? What are the advantages and/or disadvantages of Gamma Knife surgery over Cyber Knife surgery?

Munich GK: In Radiotherapy the radiation dose is not applied very accurately which means that large amounts of healthy tissue receive significant radiation doses. For this reason the total radiation dose is applied in smaller fractions so that the healthy tissues can recuperate in between the applied fractions. Radiosurgery treats very well defined targets and the surrounding tissue does not receive significant doses so there is no reason to split the radiation in smaller fractions. This makes radiosurgery more effective than radiotherapy because tumor tissue is also repaired. Furthermore, the Gamma Knife procedure can be repeated if necessary, and radiotherapy can not. Cyber Knife is a new machine composed of a linear accelerator mounted on an industrial robot device. For intracranial indications so far only a few hundred cases were published in scientific peer viewed papers. Gamma Knife is practiced for more than 3 decades and is considered to be the gold standard of Radiosurgery.

Zurich GK: The main difference between radiosurgery and radiotherapy is the high precision with which the radiation is delivered to the target and the unparalleled steep dose fall-off in radiosurgery which allows for radiosurgery to be applied in one session only. The steep dose fall-off outside the target resembles a cut with a scalpel which has lead to the name Gamma Knife. The Gamma Knife was exclusively constructed for radiosurgery of the brain by a neurosurgeon. It is the

first machine of this kind and its use has eventually lead to the new concept of radiosurgery as opposed to radiotherapy. The main difference between Gamma Knife radiosurgery and Cyber Knife radiosurgery is experience. Gamma Knife radiosurgery is the gold standard of radiosurgery with more than 300,000 patients treated world wide. Still today, the Gamma Knife is the most precise machine in radiosurgery with probably the least collateral damage in the immediate proximity of the target. In addition, all Gamma Knife radiosurgery procedures are performed stereotactically with a neurosurgical stereotactic frame applied to the patient's head to ensure the highest possible precision. This is not always the case in radiosurgery with other machines. Therefore, radiosurgery of complex skull base tumors such as pituitary adenomas or skull base meningiomas, with other machines often requires fractionation.

Which patients can be treated with Gamma Knife radiosurgery and how is it determined whether Gamma Knife radiosurgery is appropriate for a particular patient. Also explain how this decision is made in consultation prior to Gamma Knife surgery?

Munich GK: Small benign tumors and brain metastases that do not cause an immediate threat because of their space occupying effect on the surrounding brain tissue. Certain small vascular malformations like avm's (arterio-venous malformations) and trigeminal neuralgia are the main indications for gamma knife treatment.

No general guideline exists to decide which patient is appropriate for Gamma Knife treatment. Most patients discuss the option of Gamma Knife treatment with their local neurosurgeon because he is the only one who can put this treatment option into the right perspective to the other neurosurgical treatment alternatives.

Zurich GK: In general, patients with benign and malignant brain tumors, patients with arterio-venous malformations of the brain, and patients with trigeminal neuralgia may be treated with Gamma Knife radiosurgery. Typically, acoustic neuromas, meningiomas, arteriovenous malformations, and brain metastases may be treated without



Consultation

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Q&A

preceding open surgery. Tumors such as pituitary adenomas and gliomas are usually treated following open surgery. The decision whether to treat a lesion with the Gamma Knife or not is mainly based on tumor size and tumor location.

Especially deeply located, small tumors are excellent targets for Gamma Knife radiosurgery. For example, in most cases of skull base meningiomas such as meningiomas of the cavernous sinus it is not justified any more to first obtain an open-surgery biopsy of the tumor before Gamma Knife radiosurgery. The decision whether Gamma Knife radiosurgery is appropriate should always involve a neurosurgeon who is experienced in Gamma Knife radiosurgery.

What disorders can Gamma Knife treat? And can Gamma Knife be used in any other parts of the body besides the brain?

Munich GK: One of the big advantages of the Leksell Gamma Knife © is that the system is solely dedicated to the treatment of brain lesions. This makes it the most reliable and accurate radiosurgical tool for brain Radiosurgery. Brain tumors, Metastasis, Meningioma Neurinoma's of cranial nerves, Vestibular, Schwannoma's, Pituitary tumors, Pineal tumors Vasculair Pathology, Arterio-venous malformations Trigeminal neuralgia, tumors of the eye, Uvea tumors, Retinoblastoma, also other tumors, Chondrosarcoma, Chordoma, Esthesioneuroblastoma, Glomus jugulare tumors

Zurich GK: Disorders which may be treated by Gamma Knife radiosurgery are benign and malignant brain tumors, arteriovenous malformations of the brain, and trigeminal neuralgia. Gamma Knife radiosurgery is also successful in the treatment of movement disorders such as tremor. Gamma Knife radiosurgery cannot be used in any other parts of the body besides the head.

Can you explain the Gamma Knife surgery procedure and patient journey?

Munich GK: After consultation of a local neurosurgical center, the patient or neurosurgeon contacts us. After evaluating all medical reports and MRI images from recent date we confirm the indication for Gamma Knife radiosurgery.

The patient has to provide visa for Germany and

make flight arrangements to Munich and back.

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Zurich GK: First, a stereotactic frame is applied to the patient's head under local anesthesia, then, stereotactic CT scans and MRI are done. The patient then goes to the ward meanwhile the three-dimensional treatment planning is done on the computer. Once this is finished, the patient comes to the treatment room and the treatment is performed. All the various positions for the treatment isocenters are applied and the patient enters the machine for each isocenter for a calculated time period of usually several minutes. Once all the applications have been carried out, the stereotactic frame is removed from the patient's head and the patient is discharged home. The entire treatment is done in one session in one day. In Zurich, the patients are admitted to the hospital the afternoon before the treatment.

What are the complications that can arise from Gamma Knife Surgery? And what is the prognosis for patients post operation. Also what potential complications and side effects can arise?

Munich GK: Of course it depends on the disease. The most frequent complication after the treatment of brain metastases are local blood brain barrier disruptions which cause edema. After the treatment of neurinoma's there's always the possibility of neuropathy of the concerning cranial nerve.

A typical risk in the treatment of AVM's is local brain swelling and very infrequent local radio necrosis and cyst formation. This side-effect does not occur very frequently and the symptoms that may be caused are reversible in the majority of the cases. But like any other neurosurgical procedure these side effects can cause severe functional problems. Again I would like to stress the utmost importance of high quality neurosurgical evaluation and decision making to be sure that the most suitable and less risky neurosurgical procedure is selected.

Zurich GK: Potential complications include the formation of edema (local brain swelling), tumor swelling, epileptic seizures, and hearing loss in acoustic neuromas. Most of those

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Q&A

complications are rare except for the hearing loss in acoustic neuromas. Still, those complications are rare and rather mild in comparison with the more frequent and more severe complications which may occur following open surgery.

Are Insurance companies increasingly recognizing Gamma Knife surgery as a preferred procedure?

Munich GK: In Europe yes, but in Germany where decisions concerning reimbursement are taken on a rather non-rational and more political level, we still have enormous problems with reimbursement for the gold standard of radiosurgery.

Zurich GK: Unfortunately, this is not yet the case in Switzerland.

Are there any experimentations/studies being carried out with the technology, which could mean radiosurgery and Gamma Knife being used on other forms of tumors throughout the body?

Munich GK: No, the Gamma Knife is a dedicated treatment system for the Brain. But the next generation of Gamma Knife's will be able to treat tumors in the upper part of the cervical spine. Other, Linac based systems are experimenting with radiosurgery throughout the body.

Zurich GK: There are now studies involving radiosurgery for lung cancer and liver metastases. For technical reasons these treatments cannot be done with the Gamma Knife.

Because of the limited availability of Gamma Knife treatment, are you actively marketing to patients in other countries?

Munich GK: Yes we are, but also because of the reimbursement situation in Germany we are forced to reach out for the foreign market where we are actively trying to add some more prestige to the "made in Germany" high quality image.

Zurich GK: Klinik Im Park in Zurich has the only Gamma Knife facility in Switzerland.

This availability and also the fact that tumor treatment in general is one of the specialties of Hirslanden group of private hospitals are internationally communicated.

If so, what territories are you attracting patients from and are the systems in place creating a cohesive procedure with insurance companies and health services in other countries?

Munich GK: Any country with a reasonable medical and neurosurgical infrastructure, which can provide us with adequate selection criteria is potentially attractive to us. Our highest standards of best medical practice are offered for a very competitive price and come with a complete package deal.

Zurich GK: We regularly treat patients from EU countries and CIS states, mostly Russia. If a patient is insured with one of our partner insurance companies, his/her access to Hirslanden clinics is in general cash free.

Do you deal with a variety of patient types: self pay, insurance companies and employers via corporate insurance, could the procedures and systems be improved?

Munich GK: Yes we do, since the relative liberalization of the European medical care market we are operating more and more like a private company. We make direct deals with insurance companies and other organizations, but we also treat individual patients and offer them our help to get their health insurance to approve the treatment in our center.

Zurich GK: Yes, we deal with all those patient types. For patients living in Switzerland and being insured with a national health insurance, Gamma Knife treatment is covered for most indications. International patients are mostly self-payers or insured with an international insurer. Reimbursement procedures depend on which group the patient belongs to.

What do you see as being key developments in the future, for Gamma Knife surgery and radiosurgery?

Munich GK: Key development in radiosurgery, will not concern the treatment of brain pathology it will be much more concentrated on developing treatment systems for Extracranial lesions.

Zurich GK: For Gamma Knife Radiosurgery it will be the improvement of software tools and incorporation of additional imaging techniques into the planning software.

For radiosurgery in general, it will be the application of this promising technique to other organs of the body *



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