

A surgeon in full sterile attire (blue gown, mask, glasses, and hairnet) is performing a minimally invasive urological procedure. The surgeon is holding a long, thin, blue surgical instrument. In the background, a large mobile C-arm X-ray unit is positioned over the patient. A monitor displays a real-time fluoroscopic image of the surgical site, showing the instrument's tip. The patient is lying on a table, covered with a blue sterile drape.

SIEMENS

www.siemens.com/cios-alpha

Cios Alpha: Flat Detector Mobile C-Arm Imaging in Urology

Michael Straub, MD

Department of Urology, University Hospital rechts der Isar, Munich, Germany

Answers for life.

Precise and Effective Imaging for Patient-Friendly Urological Interventions

The Mobile C-Arm Cios Alpha

For Michael Straub, MD, Managing Senior Physician of the Urological Clinic at the University Hospital rechts der Isar in Munich, Germany, interventional urology is part of the everyday routine. The specialist for endourology and urinary stone treatment has worked with numerous X-ray systems in Germany and abroad, and knows the capabilities both of older mobile image intensifier systems and state-of-the-art stationary systems. Now Dr. Straub uses the new mobile C-arm Cios Alpha for the first time in urology. His conclusion: "Better than any comparable C-arm currently available."

Text: **Matthias Manych** Photos: **Sven Doering**

A prostate carcinoma is blocking the flow of urine from both kidneys. If the obstruction is not resolved quickly, organ damage, renal failure, or infections are likely to occur. However, a diversion via the urethra and ureter is not possible on this patient; therefore, Dr. Straub decides to perform a percutaneous nephrostomy – a routine procedure. However, one thing is different this time: Dr. Straub uses Cios Alpha, the new mobile C-arm from Siemens, with flat-panel detector technology. After the urolo-

gist has checked the puncture at the side of the back using ultrasound, he uses a contrast agent and X-ray to obtain a detailed image of the renal collecting system. This information allows him to position the nephrostomy catheter – which will relieve the pressure by draining the retained urine – exactly in the renal pelvis. There, the catheter is locked with a balloon, which is controlled via X-ray and by using contrast agent. "The urine is flowing, finished," Straub says, after completing the trouble-free procedure.



Michael Straub, MD, heads the endourology and stone center at the University Hospital rechts der Isar in Munich.



Simply a must: Straub views X-ray and endoscopic images side by side on Cios Alpha's two flat screens.

Bundled Imaging Information Improves Ergonomics

This minimally invasive intervention was carried out at the modernized outpatient facility of the urology department. The room may be relatively small, yet within the hospital it is a model for systematic ergonomics. Within such a space and working concept, Cios Alpha can be integrated extremely effectively. Thanks to its compact dimensions, its maneuverability and the slim monitor cart Cios Alpha fits nicely into such a space and working concept.

The two flat screens on the cart can be flexibly adjusted. This "dual-screen solution," as Straub calls it, is a significant improvement to daily work. The urologist describes the advantages: "During a renal puncture, I have the possibility of displaying the ultrasound image on one screen, and a fluoroscopy on the other. That's extremely helpful as I need both imaging modalities in parallel for guiding the puncture needle. So you can work with two image modalities at the same time."

However, it is not only ultrasound that the doctor needs to keep in optimal view together with fluoroscopic images. For an endourologist, it is also especially important to see endoscopic images at the same time. Thanks to the integrated HD Video Manager, the doctor can use a touch screen – either on the monitor cart or directly at the operating table – to call up the video signal from the HD endoscope to the flat screen.

For Straub, this is simply a must – and it is possible, keeping the monitor cart in the optimum ergonomic position at all times. Straub can remember just too well the many hours he spent in operating theaters, cramped because the individual imaging technologies and monitors could not be ergonomically combined and arranged.

HD EndoStore is another new feature of Cios Alpha that supports the increasing demands in case documentation. With this, not only X-ray images can be stored in DICOM format for patient records, but endoscopy and ultrasound images as well.

Precise Interventions, Effective Workflows

"With the possibilities that Cios Alpha offers, it is easier for me to work with greater precision; in turn, this improves the effectiveness of interventions," Straub says in confirmation of his positive experience. With the control panel on the operating table the doctor can control every aspect of the imaging process himself from within the sterile area. The same applies for the brake controls mounted at the housing of the flat-panel detector. With a button push brakes can be released for easy adjustment of the C-arm positioning in various directions. In this way, the endourologist can – for example during a bilateral nephrostomy – position the C-arm himself, according to the kidney area being treated. The possibility of controlling the system himself is, for the interventionalist Straub, extremely important – and, from his experience, Cios Alpha presents an elegant solution. It makes communication problems and misunderstandings with often-changing assistant personnel a thing of the past. Single-touch posi-

tioning is also among the workflow-enhancing usability features. A simple push of a button is all it takes to store C-arm positions and collimator settings, and to recall them fast and precisely by help of the motorization. This motorized, exact movement to two standard positions increases working precision and saves time: There is no need to search for the optimum position a second time, manually position the C-arm, or readjust the collimator. Also, single-touch positioning eliminates the need to use fluoroscopy for positioning – therefore also contributing toward dose reduction. Straub and his team use this function for example for lateral and anterior-posterior projections during cystograms or nephrostomy punctures.

Improved Patient Care Thanks to Excellent Image Quality...

Besides percutaneous nephrostomy procedures and cystograms, the Munich urologists have used Cios Alpha for inserting double J stents, conducting micturition cystourethrograms and cystostomy punctures. For Straub, there is no doubt that image quality is significantly higher than on previous generations of C-arms nor that this results in faster, more reliable diagnoses and effective treatments. According to Straub's experiences, the new mobile C-arm from Siemens – with its large field of view, fluoroscopic capabilities and simple maneuverability – offers excellent conditions for performing ureterorenoscopies and percutaneous nephrolithotomies.

Cios Alpha is equipped with a flat-panel detector that – with its 30-by-30-centimeter image area – offers an increase of 25 percent over conventional image intensifiers. Thanks to a resolution of 1,500 by 1,500 pixels, of which every pixel is read up to 30 times a second, exposures are distortion-free, detailed and high contrast. This means that small structures and the exact positions of instruments or catheters can be displayed with reliable precision. For Straub, this is a crucial factor: "Image quality increases confidence for patients, staff, and the

Michael Straub, MD



The meander of Straub's career-path has been steering him in a variety of ways toward his objective: patient-friendly therapies for urological conditions, especially urinary stones. His medical career began in 1994, at the University Hospital of Ulm, Germany. In 1998, Straub broadened his professional spectrum to include general and vascular surgery at the Ostalb Hospital in Aalen, also in Germany, where, among other things, he had a groundbreaking specialty: operating on children. Over the course of 2000, Straub moved to the laboratory, where he spent two years working intensively on the

physiology of kidneys – in particular the oxalate transporter. The specialist doctor focused his medical attention on the subject of urinary stones from 2004, once again at the University Hospital of Ulm, where he created a specialist stones clinic. In October 2006, Straub transferred to Munich for the role of Senior Physician at the University Hospital rechts der Isar, where he was immediately put in charge of the endourology and urinary stone therapy department. Of particular interest to the doctor is the treatment of urinary stones in children, which he has driven forward with determination at the facility.

Thanks to his experience and specialist knowledge, Straub travels to numerous international assignments each year, supporting urological procedures or leading them himself, as required. As a result of this, the endourologist has a broad scope for comparison, when it comes to the respective equipment employed.

In his research, Straub has dedicated himself to the photodynamic diagnosis of bladder carcinomas, the future development of scopes for stone treatment, and the use of medication to eliminate the development of urinary stones. In addition, Straub is engaged in the working group on urolithiasis of the European Association of Urology (EAU), as well as within the German Society of Urology (DGU).

“With the possibilities that Cios Alpha offers, it is easier for me to work with greater precision.”

Michael Straub MD, Senior Physician of the Urological Clinic at the University Hospital rechts der Isar in Munich, Germany

Case Example: Cystogram Check-up Following Radical Prostatectomy Using Cios Alpha

Disease: In western countries, the prostate carcinoma is the most common malignant tumor in men; each year in Germany, 70,000 patients develop the condition. Aggressive forms demanding immediate treatment more commonly affect men under 70 years of age. If the tumor is confined within the prostate and no metastases have developed, the condition can be treated with a view to curing it completely. One of these curative procedures is a radical prostatectomy.

Patient: 72-year-old male. Diagnosis of T3b Gleason 7b prostate cancer. Intraoperative cold cut section revealed infiltration of the bladder neck. Therefore wide-margin resection was necessary to get the optimal oncological result.

Therapy Decision: Because of the development of the diagnosed patient's prostate carcinoma, a retropubic, wide-margin radical prostatectomy was carried out. In

the first follow-up a leakage of the bladder neck was apparent in the X-ray images. Two weeks later, there was a follow-up cystogram to check the leakage again and to pinpoint its exact location.

Intraoperative Challenge: To be able to assess the residual bladder leakage and its exact position, it was important to display the bladder area from two directions: anterior-posterior and lateral. Both of these positions, along with the saved collimator settings, could be called up automatically and quickly using motorization and single-touch positioning. Also important: high resolution and contrast between the bladder and the surrounding tissue.

Result: The zoom function supported the diagnosis that the leakage was minimal and restricted to the right dorsal of the bladder. The indwelling catheter could be removed.

Interventional Imaging in the Endoscopic Treatment of Urinary Stones in Children

Doctor Straub, within your field you have a particular specialty: the treatment of children. How many do you treat each year and which ones?

Straub: Of the around 450 endoscopic treatments of stones each year, we treat roughly 25 children endoscopically. That is probably more than anywhere else in Germany. We also have young patients from Austria and Switzerland here. Besides the children with congenital metabolic imbalances such as cystinuria or primary hyperoxaluria, we are seeing increasing numbers of seriously sick children who have been drip-fed for long periods of time. Such patients come to see us with stone-related illnesses when they are between five and six years old.

What are the most significant challenges?

Straub: A child's kidney is as tiny as his or her fist. Those are the dimensions we have to work within. That requires you to have an even steadier hand and be even more focused. It is like a game of chess, you have to think several moves ahead. It also places particular demands on the anesthesiologist, respiratory pressure has to be monitored constantly and updates given, excretion medication may be required.

What demands does an X-ray system need to fulfill?

Straub: For the endoscopic therapy of children, it goes without saying that the X-ray technology must deliver

excellent image quality and offer extra features that reduce dose. With Cios Alpha, this is very well implemented. The high resolution that the flat detector technology delivers is of considerable assistance in showing the tiny anatomy of a child. Collimation to the left or right half side of the urinary tract has become much easier with the new asymmetric collimation. It should also not be overlooked that, thanks to Cios Alpha's precise motorization and altogether better usability, one can concentrate on the patient and reduce the duration of the intervention at the same time.

With regard to radiation – what techniques do you apply in particular to keeping it to a minimum?

Straub: For example, I reduce dose by removing the grid from the flat-panel detector, by using the already mentioned asymmetrical collimation and by radiation-free positioning. In the latter case, I can control my collimation adjustments by a graphical overlay on the last image hold without using further fluoroscopy. Furthermore, I additionally reduce dose with decreased pulse rates during fluoroscopy or by using pediatric organ programs with adapted X-ray parameters for examinations of children.



Straub has put the mobile C-arm Cios Alpha to the test.

administrating clinic that everything is in order when the patients are released," he says, before showing a cystogram performed on Cios Alpha as an example. "Here I can recognize all the important details and be certain that everything is okay."

... and Reduced Radiation

While in the past several exposures were needed to cover the complete area, now a single image is often sufficient. This reduces dose for both patients and medical staff. The field of view of the C-arm can be conveniently expanded in order to cover the urinary tract of adults that often extends to 40 centimeters as Dr. Straub explains. "I use an oblique projection and cover everything from the calyceal group down to the pelvis." All it takes is a button push at the flat-panel detector housing and the C-arm moves to the required angulation. Straub emphasizes that besides dose reduction the workflow also improves when only one image has to be assessed instead of two or three.

Cios Alpha's innovative collimation system further reduces radiation dose significantly. It allows for asymmetric collimation to adjust the field of view to the area of interest. For Straub, this feature is especially important for young women and children: "Now, even on a one-year-old infant, I can collimate to display just the tiny urinary tract." To further reduce the dose on small patients, it is possible to remove the grid from Cios Alpha's flat-panel detector, without any considerable effect on image quality.

Image Quality and Safety in Daily Routine

Further features complement the high levels of image quality and safety achieved with Cios Alpha. For example, the flat-panel detector uses red laser light to project crosshairs onto the area of interest, allowing the doctor to adjust the central beam with precision. The zoom function makes it possible to distinguish even tiny structures. This is something that

Straub especially appreciates when treating very young patients, with their small anatomies, as it means he can better plan for the next treatment stage during an intervention. The mobile C-arm combines a 25 kW high-power generator with an active cooling system. This allows for outstanding image quality even for obese patients and also throughout long-lasting procedures.

Matthias Manych, a biologist, is a freelance scientific journalist, editor, and author specializing in medicine. His work appears primarily in specialized journals, but also in newspapers and online.

➔ www.siemens.com/cios-alpha

Cios Alpha is not commercially available in all countries. Due to regulatory reasons its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

The statements by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results. The speaker is employed by an institution that provides Siemens product reference services for compensation pursuant to a written agreement.

On account of certain regional limitations of sales rights and service availability, we cannot guarantee that all products/services/features included in this brochure are available through the Siemens sales organization worldwide. Availability and packaging may vary by country and are subject to change without prior notice.

The information in this document contains general descriptions of the technical options available and may not always apply in individual cases.

Siemens reserves the right to modify the design, packaging, specifications, and options described herein without prior notice. Please contact your local Siemens sales representative for the most current information.

In the interest of complying with legal requirements concerning the environmental compatibility of our products (protection of natural resources and waste conservation), we may recycle certain components where legally permissible. For recycled components we use the same extensive quality assurance measures as for factory-new components.

Any technical data contained in this document may vary within defined tolerances. Original images always lose a certain amount of detail when reproduced.

Global Business Unit

Siemens AG
Medical Solutions
X-ray Products
Henkestraße 127
DE-91052 Erlangen
Germany
Phone: +49 9131 84-0

Global Siemens Headquarters

Siemens AG
Wittelsbacherplatz 2
80333 Muenchen
Germany

Global Siemens Healthcare Headquarters

Siemens AG
Healthcare
Henkestraße 127
91052 Erlangen
Germany
Phone: +49 9131 84-0
www.siemens.com/healthcare

Legal Manufacturer

Siemens AG
Wittelsbacherplatz 2
DE-80333 Muenchen
Germany