

Achieving Minimally Invasive Treatment

—Efforts of Osaka Saiseikai Nakatsu Hospital—

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Due to the increasing complexity and sophistication of percutaneous coronary interventions (PCIs) in recent years, there is a demand for angiography systems that can reduce exposure doses and contrast media usage, and shorten examination times. Shimadzu's latest Trinias series MiX package angiography system includes a variety of original functions that provide minimally invasive treatment based on the concept of "MiX: Minimally invasive eXperience."

This article describes the efforts of Osaka Saiseikai Nakatsu Hospital in implementing minimally invasive treatment on obtaining the Trinias series angiography system.

1 Using a Low Dose Fluoroscopy/Radiography Program

Maximizing the strengths of the latest SCORE PRO Advance image processing engine, which balances reduced radiation exposure with increased image quality, Osaka Saiseikai Nakatsu Hospital created fluoroscopy and radiography programs that achieve a lower exposure dose compared to default system settings.

- **Fluoroscopy program: 7.5 pps/Low**
(Approximate 60 % reduction in exposure compared to default system setting of 10 pps)
- **Radiography program: CAG15f (-)**
(Approximate 50 % reduction in exposure compared to default system setting of CAG15f)



Radiography at CAG15f (-). Approximate 50 % reduction in exposure dose compared to default setting. Contrast media is clearly visible in microchannels.



A Word from Yoichi Kijima, M.D., Ph.D., Deputy General Manager, Department of Cardiovascular Medicine

In order to provide more sophisticated treatments with higher accuracy and minimal invasiveness (low exposure, low contrast media volume, short duration), we have combined optical coherence tomography (OCT) with an angiography system as standard PCI imaging device. While I realize that Trinias was designed based on a concept of minimally invasive treatment, I also consider the system to have been developed based on an overall good understanding of treatment (PCI and EVT) in terms of its ease of operation, image quality, and feature usability. The Trinias system is a significant benefit not only to patients, but also to us as medical practitioners.

The hospital has reported that wires are clearly visible without residual images at lower fluoroscopy rates. Also, for lower extremities in which there is little subject movement, they perform treatment with even lower exposure doses of 5 pps/Low.

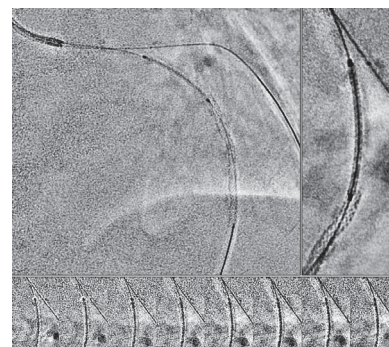
They are also performing radiography at around half the radiation dose of default system settings. This low-dose program increases image noise slightly without interfering with vessel visibility. The program is also able to show collateral CTO microchannels clearly, which reduces the number of X-ray image acquisitions and amount of contrast media used.

2 Frequent Use of Fluoroscopy Recording and OneShot Radiography

Reductions in radiation exposure are achieved by using fluoroscopy recording and OneShot radiography to record images during ballooning and IVUS instead of normal digital angiography (DA). For example, obtaining 6 images of a balloon during PCI by DA requires a dose of 10 mGy, while obtaining these images by fluoroscopy recording requires a dose of 0 mGy due to no additional irradiation. Meanwhile, OneShot radiography keeps X-ray exposure to a minimum by requiring just 1 image unlike DA. The operator can switch between DA and OneShot radiography simply using the IVR NEO bedside console or a keyboard shortcut, so changes can be made without interfering with a procedure.

3 Utilizing SCORE StentView+Plus

The degree of overlap between stents is incredibly important in situations such as balloon post-dilatation, positioning relative to stent edges, and placement of multiple stents at a long lesion. Conventionally, devices must be placed during cardiac motion. SCORE StentView+Plus (StentView) is software that reduces the effects of cardiac motion in real time, which allows the stent edges to be depicted clearly. StentView allows for accurate positioning in a single attempt without the need to perform extended fluoroscopy during positioning and repeated radiographic imaging to confirm stent placement. StentView also uses the same radiation dose as used during normal radiography, so results in reduced exposure doses.



SCORE StentView+Plus

4 Efficacy of SCORE Navi+Plus (CT Images)

Determining the working angle is immensely important in cases of bifurcation lesions. SCORE Navi+Plus can coordinate the C-arm angle and VR (Volume Rendering) image angle during treatment based on CT data obtained in advance that is loaded into a SCORE 3D workstation. This allows the working angle to be determined in advance based on VR images, which reduces contrast media usage and radiation exposure. This technique has even been used in some cases to perform lower extremity PTA treatment using no contrast media. Because multiple angles can be registered into the SCORE 3D workstation, even when there are multiple working angles, the angles can be easily read out, which makes the workstation effective even during complex treatments.



Working angle determined from CT images of the LAD and D1 bifurcation lesion, and angle transmitted to the C-arm.

Note: We requested Osaka Saiseikai Nakatsu Hospital to use SCORE Navi+Plus as a trial in order for them to effectively use preoperative CT images.