# Vascular

## Using the Trinias Series MiX package for Minimally Invasive Treatment —Saga University Hospital—

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**Saga University Hospital (Saga, Japan) opened in 1981 as Saga Medical School Hospital. As the last bastion of medicine in Saga Prefecture, in 2003 Saga Medical School Hospital combined with Saga University to become the institution it is today. Based on a philosophy of "Aiming to be the chosen hospital of patients and health care providers alike," Saga University Hospital provides state of the art treatment every day with the goal of contributing to community healthcare, cultivating good health care providers, and conducting developmental research into advanced medical technologies. In a joint enterprise with Saga Prefecture, since 2014 Saga University Hospital has also operated a helicopter ambulance. A helipad was also built into the roof of the south clinical service building, which was newly constructed in 2015.**
**The Department of Cardiology has two of Shimadzu's Trinias MiX package bi-plane angiography systems, which started operation in March 2015. Because Saga University Hospital accepts emergency patients on a 24-hour basis and these systems can accommodate all procedures performed under fluoroscopic guidance, they are used to their fullest extent.**
**In this article, Yutaka Hikichi, M.D. is interviewed about minimally invasive treatment, which has become possible since the Trinias systems were introduced.**

New south clinical service building with helipad

Large control room allowing large staff meetings

**—Please explain the history behind the introduction of Trinias at your hospital.**

We were already operating two angiography systems, but used a 35th-year building renovation project as an opportunity to obtain new systems. We listened to various angiography system manufacturers, but the focus for our selection was how the system would benefit patients, and how the system was safe and easy for operators to use. While each equipment manufacturer promoted the high image quality, low radiation dose, and latest applications possible with their respective products, we were attracted to the real time image processing performed by the latest software used by Trinias. We also liked the manipulability of the C-arm on the Trinias, and believed the system could be put to immediate use **(Fig. 1, 2)**.

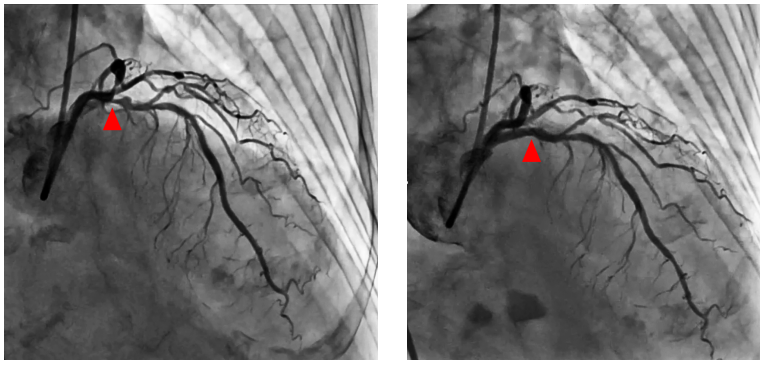
**—What did you think of Trinias when you came to actually use it?**

**Combines High Image Quality and Low Radiation Dose**

The systems produce very clear images both from

**Fig.1** Trinias B12 MiX package (started use in March 2015)
Used for ablation, peripheral vessels, and coronary arteries due to its wide field of view.
Includes software and hardware that allows it to be used as a backup system for abdominal area and head procedures.

**Fig. 2** Trinias B8 MiX package (started use in August 2015)
Used specifically for coronary arteries.



Pre Final

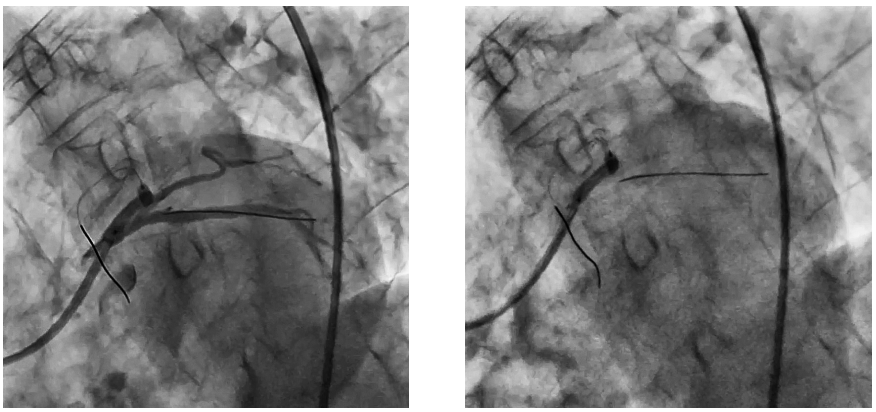
**Fig. 3** Radiography images before and after treatment. Side branches and even small vessels are depicted clearly.

fluoroscopy and radiography **(Fig. 3)**. However, to be honest, since the adoption of FPDs, all manufacturer's systems can produce clear images at radiography doses. Going forward, of greater importance for angiography systems will be at how low a dose fluoroscopy images can be produced that may be used during PCI procedures. The SCORE PRO Advance image processing software installed on Trinias comes with a motion tracking noise reduction function that reduces image noise while tracking the catheter tip image in real time. You can see there is almost no blurring of the catheter tip when you actually use this software in a clinical setting. This technology allows for clear visualization of the catheter tip even at low fluoroscopy pulse rates, making it good enough for PCI procedures, and likely allows fluoroscopy to be used in place of radiography **(Fig. 4)**. Since introducing the Trinias systems to our hospital, we have further expanded our use of low dose treatments by lowering fluoroscopy pulse rates and making frequent use of fluoroscopic image recording **(Fig. 5)**. While Shimadzu recommends a fluoroscopy mode of 10 pps (Normal) for low dose treatments, we are often able to successfully use 7.5 pps (Low) for dose reduction. As for fluoroscopic image recording, the image is recorded immediately as soon as you press the button, and displayed on a monitor in no time at all. Also, the next fluoroscopy procedure can be started immediately, which allows fluoroscopic image recording to be performed with almost no change to the existing workflow.

## Eliminates Geographic Misses

Another major reason we chose Trinias was because it comes with the SCORE StentView+Plus (hereafter "StentView") application. StentView uses markers on the balloon to stabilize images of a moving stent in real time. This function of StentView eliminates geographic misses, is very useful for ensuring safe post-dilatation after stent placement, and can even be used during wire recrossing. Above all, this function operates in real time and can be used while the stent or post-dilatation balloon is being moved, enabling exact placement **(Fig. 6)**.

StentView automatically recognizes two markers, though it may also erroneously recognize metal implants and other materials used during surgical treatment, depending on the case. To counter this, the latest version of StentView enables a region of interest (ROI) to be specified manually around the desired markers **(Fig. 7)**. With its combination of existing real time processing abilities and new ROI specification function, we anticipate that StentView will be able to accommodate a variety of procedures.



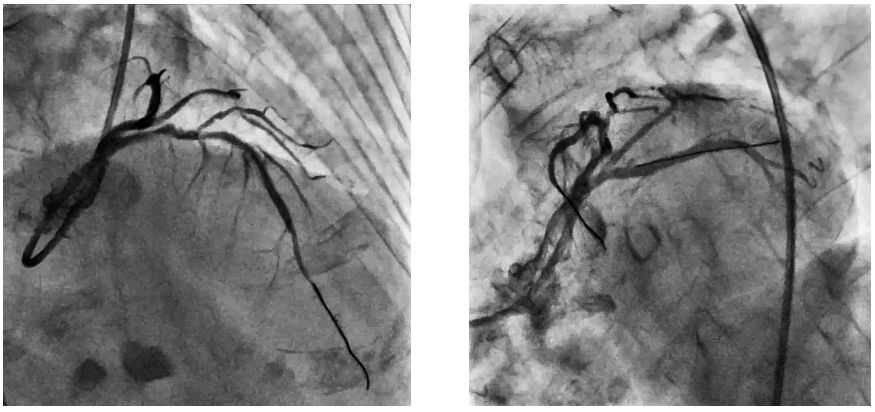
LAO50/CAU38, 99KV/302mA, 277mGy/min

LAO50/CAU38, 99KV/14.4mA, 46mGy/min

RAO30/CRA35, 83KV/371mA, 256mGy/min

RAO30/CRA35, 83KV/13.4mA, 34mGy/min

**Fig. 4** Comparison of radiography (left) and fluoroscopy (right) of the same site
The radiography images are of higher quality, but the quality of the fluoroscopy images is high enough for clinical use.



RAO30/CRA35, 84KV/13.9mA, 35mGy/min

LAO50/CAU38, 97KV/14.4mA, 42mGy/min

**Fig. 5** Bi-plane fluoroscopic image recording
Fluoroscopic image recording provides image quality sufficient for images with contrast enhancement used for stent placement.

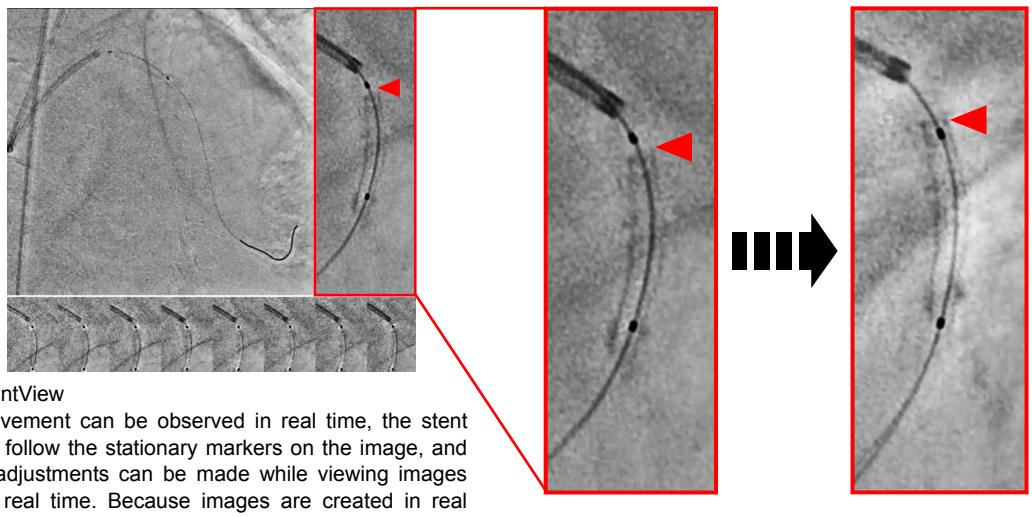


**Fig. 6** Moving StentView
Marker movement can be observed in real time, the stent appears to follow the stationary markers on the image, and positional adjustments can be made while viewing images created in real time. Because images are created in real time, it eliminates the need for pressing the footswitch and waiting for an updated image to be displayed.

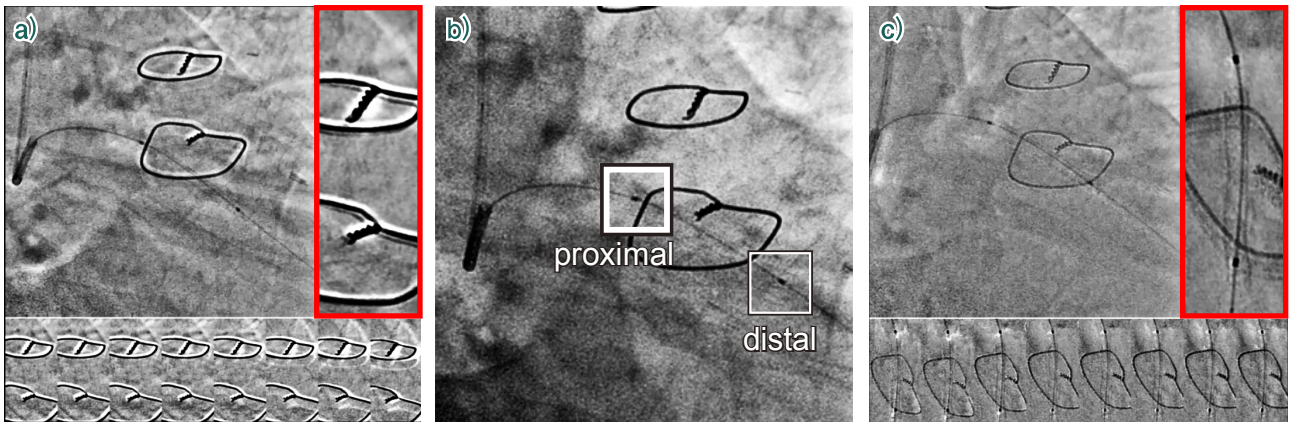



**Fig. 7** Comparison of ROI StentView with the previous method
In **(a)**, automatic detection performed by the previous method erroneously recognizes metal used by the surgical procedure.
In **(b)**, ROI StentView is used to manually specify ROIs around the markers to be recognized, and in **(c)** StentView displays the image as expected.

### Wide Range of Movability of Bi-Plane Systems

We introduced two bi-plane systems. The C-arm can move along many axes, which allows the operator to select their position freely according to the treatment or procedure. For example, setting the frontal arm at an angle across the head of the patient allows easy access to the patient's head. The systems are also designed with the arm base positioned away from center, allowing complete access to the patient's head **(Fig. 8)**. The ceiling traveling monitor can also be moved freely left or right of the catheter table and towards the feet, which is extremely useful during pacemaker insertion surgeries and procedures on patients with intratracheal intubation **(Fig. 9)**.

**Fig. 8** Frontal arm positioned at an angle across the head of the patient. Provides easy cranial access.

**Fig. 9** Monitor positioning is also adjustable, allowing monitor viewing through the arm.

### —Could you tell us about future topics for research?

Although I have used Shimadzu's angiography systems as a clinician who performs catheterization, I have a longer association with Shimadzu's equipment working as a researcher. For many years, I have been researching stent placement at vessel bifurcations at a level that is close to clinical application. During this research, I use Shimadzu's Microfocus CT (inspeXio) **(Fig. 10)** system to observe the detailed geometry of bifurcation stents.
Meanwhile, I have also started to research stents that are absorbed into the body (bioresorbable scaffolds [BRSs]) that are likely to receive regulatory approval for use in Japan quite soon. These stents are said to be almost invisible to angiography devices, so Shimadzu's StentView shows great promise in this area.

**Fig. 10** Microfocus CT system (inspeXio)
Used to observe the detailed geometry of bifurcation stents.

### —Thank you.