1 Using the Virtual Stent Function

Fukuoka Kieikai Hospital uses the virtual stent function for carotid artery stenting (CAS). The virtual stent function displays virtual stents in blood vessels shown in a 3D images, based on the specified stent size (length and diameter). Unlike functionality that only performs measurements, this function enables visual confirmation of the stent implant location and post-implant coverage range (Fig. 1).

Fukuoka Kieikai Hospital not only anticipates using the function for CAS procedures, but also for stent-assisted coiling of cerebral aneurysms (Fig. 2). For such procedures, it is extremely important for the stent to adequately cover the neck portion of aneurysms, which can be confirmed visually using a virtual stent. We received feedback that it tends to overestimate the length in a bent vessel, but being able to visually confirm the coverage with a virtual stent is more than adequately beneficial.”

2 Utilizing Blood Vessel Measurement Functionality

In many cases treating cerebrovascular diseases, such as carotid stenosis or cerebral aneurysms, requires measuring vessel diameters and distances in multiple locations.

Normally, such diseases are measured using relatively simple distance measurement functionality, but Fukuoka Kieikai Hospital uses the vascular measurement functionality in SCORE 3D workstation, especially for CAS procedures. That functionality automatically analyzes the major and minor diameters at any cross section of the specified blood vessel and the distances.
between measurement points and then displays a summary of the measurement results within a single screen (Fig. 3). In the case of CAS procedures, for example, it can also simultaneously analyze the blood vessel diameter at the lesion area, the vessel diameter at a reference point, the distance between reference points used to determine the length of the stent to be implanted, and the vessel diameter at the position where the protection device is to be implanted. Specifying the blood vessel to be analyzed involves simply plotting two points.

We received feedback that “The functionality is very convenient, because almost all the information necessary for treatment can be understood at a glance using simple operations using that functionality.” The functionality can also be used to analyze stenosis.

3 Utilizing Multiple Functions for Reviewing Working Angles

Using an appropriate working angle for coil embolization of cerebral aneurysms is an important element for maximizing therapeutic benefits. Furthermore, because the angle is determined during the procedure on the day of surgery, it needs to be determined as quickly as possible.

To determine the appropriate working angle quickly, Fukuoka Kieikai Hospital uses a combination of two functions. The first is the 3D image transparent display mode (Fig. 4). The transparent mode displays blood vessels with semi-transparency, which is helpful for understanding how the blood vessels overlap in the depth direction. The second is the 3D dual-display mode. Trinias series systems can simultaneously display up to four 3D images, but they use the dual-display mode to quickly decide the working angles of both planes on the same screen (Fig. 4).

They also use three rotation dials for angle adjustments (Fig. 4). Because 3D images can be freely rotated using the mouse, it may seem difficult to determine the working angles while taking into consideration the C-arm movement range. In contrast, it seems much easier to determine working angles while taking into consideration the C-arm movement range by using the dials, which enable the angle to be adjusted to only one direction. Once working angles are determined, the angle transmission function is used to send the angles to the C-arm.1 Specifically, the workflow consists of “using the left-right dial to adjust the orientation around the body axis (LAO/RAO), using the up-down dial to adjust the orientation in the body axis direction (CRAN/CAUD), using the mouse to make fine adjustments to the working angles, and then sending the angles to the C-arm.” The workstation software also includes an angle memory function that can record multiple working angles for easy recall later (Fig. 5).

*1: The angle transmission function is only enabled for the frontal C-arm.