



Interview

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for trauma centers

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Some patients with acute trauma may inevitably require invasive treatment such as an open surgery, but there has been a gradual shift to more minimally invasive procedures. Recently, this trend has accelerated. Interventional radiology plays an important role in this paradigm shift and is being applied in the treatment of trauma patients.

Jeonbuk Regional Trauma Center at Wonkwang University Hospital was the first facility in Korea to implement an Angio-CT hybrid emergency room to further enhance minimally-invasive treatments for patients. Interventions require the support of diagnostic imaging and angiography guidance:

An Angio-CT solution allows CT scans and interventional treatment to be performed in one place without the need to transport patients. This combination allows fast diagnosis and treatment and is recognized as a suitable life-saving measure during the “golden hour”* which is essential in saving the life of trauma patients. We interviewed interventional radiologists Dr. SungNam Moon, HyunSeok Jung, and SangHyun Seo of Jeonbuk Regional Trauma Center at Wonkwang University Hospital, to talk about their experience with the Angio-CT suite.

In 2009, Korea was the only OECD country without regional trauma centers; however, since 2021, Korea now has 17 regional trauma centers throughout the country.

The Wonkwang University Hospital, located in Iksan City, Jeollabuk-do, with a population of 300,000 residents, opened the Jeonbuk Regional Trauma Center in 2019. This center stands out because its trauma medical staff now includes dedicated interventional radiologists who are on duty around the clock. Thanks to its new Nexaris Angio-CT suite, the center is at the forefront of patient treatment and leads the way in new approaches to trauma management.

One-stop solution, fast and efficient without moving patients

The Angio-CT suite combines CT imaging with angiography to enable resuscitation, CT imaging, interventions, and operations all in one place. The Jeonbuk Regional Trauma Center at Wonkwang University Hospital, a tertiary general hospital with 900 beds, perform interventions on trauma patients without the need to transfer patients. After the inhouse duty of the interventional radiologists was introduced, a significant percentage of trauma treatment approaches changed from operation to intervention. The number of interventional treatment cases for trauma patients per year increased from 14 in 2017 to 152 in 2019. The average door-to-puncture time has dramatically decreased from 88 minutes to 48 minutes by removing the need to transport the patients physically from the CT room to the angio suite.



SangHyun Seo, MD, SungNam Moon, MD, HyunSeok Jung, MD

“The greatest difference the Angio-CT suite has made is that patients do not need to be moved. I think it is very patient-centric because after the CT scan we can perform any treatment required with the patient in the same position as for the CT scan.”

SungNam Moon, MD



Dr. SungNam Moon is an interventional radiologist and clinical assistant professor at Wonkwang University Hospital, Korea. He has been working at Wonkwang University Hospital since years and is very experienced in diverse interventional procedures. He is the public communication committee chair of Korean Society of Interventional Radiology (KSIR), the public communication/ethics committee secretary of Korea Society of Traumatology (KST), member of Korean Society of Radiology (KSR) and member of Korean Association for Research, Procedures and Education on Trauma.

What was the role of interventional radiology (IR) in the treatment of trauma? Do you think this role has changed in recent years?

Dr. SungNam Moon: "When interventional treatment was introduced to the field of trauma, where the main therapy consisted of surgical operations, the use of angiography made it possible to concentrate on the exact bleeding site to stop the bleeding. Many severe trauma patients lost their lives because it was not possible to provide fast, suitable treatment, but it is now possible to treat them quickly and effectively. However, regardless of these advantages, the trauma center was unable to use interventional treatments until now because, generally, interventional radiologists are not stationed at the hospital. It takes about one hour – or often much longer – for IR doctors to reach the trauma center.

Since the role of interventional radiology has gained larger importance in developing nonoperative management (NOM) concepts, as has been emphasized in recent publications. The key role for interventional radiologists in treating trauma patients has been performing the initial diagnosis based on diagnostic imaging such as CT and ultrasound. Now their importance has increased in determining whether to perform an operation or interventional treatment immediately after the patient admittance based on an evaluation of the CT scan."

In 2018, the number of interventional treatments of trauma patients significantly increased in Wonkwang Hospital. What led to this change?

"In 2018, the Angio-CT suite had not yet been installed, but interventional radiologists had already been assigned to the trauma response team and started in-house duty. It seems that the number of cases has increased because as soon as an emergency patient arrives, the interventional radiologist performs a CT scan and initial diagnosis is available within 10 minutes allowing immediate treatment."

"We started using the Angio-CT suite in October 2019 and have performed interventional treatment on approximately 200 to 300 patients. If we also include the patients sent to the operating room after the CT scan, the total is over 500."

How did you or Wonkwang Hospital come to the decision for an Angio-CT solution?

"We had considered an Angio-CT suite from the initial planning phase to build the Jeonbuk Regional Trauma Center. We had seen advanced Angio-CT suites in Japanese hospitals, and we thought it was very effective. The decisive reason for choosing an Angio-CT suite was its patient-centric approach: with the Angio-CT suite, we can stop bleeding quickly and effectively. We were able to save the lives of several patients who had reached the crossroads between life and death – which can be a period of less than a minute.

What changes have you experienced since you started working with the Angio-CT suite?

"The greatest difference the Angio-CT solution has made is that patients do not need to be moved. In the case of trauma admittance patients, because of unstable vital signs (including blood pressure, body temperature, pulse rate, respiratory rate). However, after positioning the patient on the table of the Angio system, the CT scanner can be moved rather than the patient. I think it is very patient-centric because after the CT scan, we can perform any treatment required with the patient in the same position as for the CT scan. Moreover, the CT gantry on sliding rails allows us to use a ventilator for mechanical ventilation instead of an ambu bag for manual resuscitation during a CT scan. Therefore the medical team is not exposed to unnecessary radiation when standing next to the CT scanner."



Nexaris Angio-CT

“From the hospital’s perspective, Nexaris Angio-CT has the advantage of also performing CT scans for non-trauma patients because it is a two-room setup. In trauma centers, there are often long periods with no trauma patients, so the system can be used more efficiently.”

HyunSeok Jung, MD



Dr. HyunSeok Jung is an interventional radiologist and clinical assistant professor at Wonkwang University Hospital, Korea. He has been working at different hospitals and has more than 10 years experiences in interventional radiology. His research interests are trauma intervention while he has published numerous articles based on his experiences.

Time is critical in trauma treatment – are there any improvements regarding the overall time needed to treat patients?

Dr. HyunSeok Jung: “Nonoperative treatment of trauma patients has recently become a fast-growing trend and is increasing in importance. Diagnostic imaging is needed to make decisions in relation to any nonoperative treatment.

Angio-CT makes faster diagnosis possible. To speed up the time between diagnosis and treatment and therefore improves the prognosis for the patient.

In case of severe trauma, patients are often hemodynamically unstable which takes more time. The Angio-CT reduces the need for patient transfers dramatically. Treatment can be administered easier because there is no need to move the patient for resuscitation, CT scan, or interventional treatment after arriving at the hybrid emergency room. It is essential to stop bleeding quickly and Angio-CT can shorten the time required for final hemostasis. It plays an important role in treating our patients in the trauma center, where time can mean the difference between life and death.”

Is it improving the outcome of your patients?

“There are different approaches to treat pelvic fracture patients: one key approach is to embolize, blocking blood flow in the pelvic region through intervention. After we began using the Angio-CT suite, it became apparent that the average time to stop bleeding through arterial embolization was much shorter than the average time reported in published studies. In addition, in spleen or liver treatments, for example, the percentage of interventional treatments is considerably higher than for other operative therapies. Also, in this case, we have noticed that the time required to stop bleeding is much shorter.”

Which Angio-CT features are most helpful to your trauma workflow?

“From a doctor's viewpoint, performing a CT scan without transferring the patient was most helpful. When the condition of a patient is unclear, I can follow up using the CT scan. The resolution from a cone-beam CT scan using angiography equipment is not always sufficient especially for patients who are unable to control their breath. Angio-CT imaging, however, is able to achieve good image resolution because it's much faster. From the hospital's point of view, Nexaris Angio-CT has the advantage of also performing a CT scan for non-trauma patients because it is a two-room setup. In trauma centers in particular, there are often long periods with no emergency patients, so the system can be used more efficiently. Actually, the number of CT scans performed with the Angio-CT suite was about 80% of that with a standalone CT scanner, so we can say it is very efficient and economical.”

Are there any changes in the operative workflow in the new trauma center?

“The time required to treat a patient has decreased. One of the main factors used to evaluate and compare trauma centers is the time needed for treatment decision. Angio-CT helps shorten this time through fast radiological examinations. It can quickly triage the patients who do not need operative treatments to reduce the number of unnecessary procedures. Furthermore, the time required for minimally-invasive interventions is also lower than for operations – from the start to the end of the treatment, including the patient's hospitalization period.”

What is your experience regarding workflow improvement with the Angio-CT solution?

Dr. SangHyun Seo: "Before using the Angio-CT solution, it took a minimum of 30 minutes up to an hour to perform a CT scan. A CT scan was possible only after patients have been resuscitated because, for patients to be able to leave the resuscitation room, they should be hemodynamically stable. The conservative treatment (intravenous injection, etc.) in the emergency resuscitation room before the diagnosis does not stop bleeding, so valuable time can be lost. After using the Angio-CT solution, we are able to perform a CT scan while monitoring the patient's vitals in real time without transferring the patient to the CT room. The average door-to-CT time dropped significantly from 52 to 26 minutes. It is now possible to scan patients who were previously unable to be transferred to CT because of their very unstable hemodynamical condition."

What is your vision for trauma treatment in the future?

"For treating severe trauma patients, the "golden hour" between the trauma onset and the appropriate treatment including stopping of bleeding is critical. The Angio-CT suite is optimized for this purpose, and I think it will be used more actively in the future because it benefits trauma patients in many aspects. For example in case of trauma laparotomy, the abdomen must be opened from the upper area to the lower area and the wound is relatively large.

Interventional treatment requires just a small incision that will probably heal sooner. Patients are happier with this result. Interventional treatment has another advantage because even for retroperitoneal hemorrhage and pelvic trauma – which are difficult to perform using operational approaches – it is simple using angiography. Using Angio-CT equipment for trauma patients was first started in Japan.

There are about 10 hybrid emergency rooms in Japan, but there is only one in Korea: Jeonbuk Regional Trauma Center at Wonkwang University Hospital. We are trying our best to get more Angio-CT installed in other trauma centers in Korea as well."

Do you have any other comments?

"Interventional treatment is performed at many other university hospitals but Wonkwang University Hospital can treat emergency trauma patients faster because the hospital has an Angio-CT in the emergency room. And, for the first time in history, interventional radiologists are on duty at the hospital around the clock. Of course, there are times when we feel it is really tough for just three IR doctors to be on duty but it is worthwhile because our job is to save patients' lives.

However, the cost of installing the equipment is not negligible, and it can be a challenge to redesign room structures to accommodate the hybrid system. For trauma centers in Korea, it is difficult without support from the government. My great hope is that there will be support from the government to finance the installation of Angio-CT to meet the needs of trauma centers, making the best use of the "golden hour" and saving the lives of more trauma patients."



Dr. SangHyun Seo is an interventional radiologist and clinical assistant professor at Wonkwang University Hospital, Korea. He has been working at Wonkwang University Hospital since years and is very experienced in diverse interventional procedures.

“Angio-CT allows CT scans while monitoring the patient's vitals in real time without patient transferring. The average door-to-CT time dropped from 52 to 26 minutes. Moreover, it is now possible to scan patients who were previously unable to be transferred to CT due to very unstable condition.”

SangHyun Seo, MD

The statements by Siemens Healthineers' customers described herein are based on results that were achieved in the customer's unique setting. Because there is no "typical" hospital or laboratory and many variables exist (e.g., hospital size, samples mix, case mix, level of IT and/or automation adoption) there can be no guarantee that other customers will achieve the same results.

**The golden hour is the period of time immediately after a traumatic injury during which there is the highest likelihood that prompt medical and surgical treatment will prevent death.*

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