

Japan's surgeons joined over 100 trauma operations in 2 months. Although penetrating injuries (e.g. stab and gunshot wounds) are rare in Japan, Japan's surgeons experienced 14 penetrating injury cases in the same period. Still, the number of trauma surgeries conducted in India is much higher than in Japan. Trauma surgery experience possessed by surgeons at JPNATC is simply unobtainable for surgeons in Japan. India's trauma surgeons could therefore contribute greatly to strengthening trauma treatments in Japan.

At AIIMS, each individual trauma surgeon is highly capable and skilled in various surgical techniques; their excellent performance is evident in the quality of surgeries conducted. However, there is potential for growth such as by enhancing leadership and team management. The importance of a team approach has in fact gained much attention in Japan recently. There is increased recognition that not only technical skills but also non-technical skills should be honed, especially in trauma care. Thus, training courses such as the Surgical Strategy and Tactics for Trauma (SSTT) course are developed and provided for surgeons and nurses. The purpose of these courses is to build a team and to train personnel on how to manage severe trauma patients in an emergency or operating room as a team. Teamwork techniques are employed in different industries but are especially important in healthcare settings where patients' lives and wellbeing are at stake. From this perspective, the participation of Japanese surgeons in trauma care at AIIMS through this project could also contribute to the level of trauma care in India.

2.2. Report from the 2nd group

The Japanese surgeons in the second group stayed at JPNATC for a month and a half during which they were involved with more than two hundred operative cases and 1,300–1,500 trauma patients per week. They also witnessed five gunshot victims, including non-surgical cases. These patients were remarkably well managed. Management included the initial assessment and resuscitation at the emergency department and the activation of a surgical team in the operation theatre. In discussions between AIIMS surgeons and Japanese surgeons, it was pointed out that the availability of operation theatres and computed tomography (CT) scans is the most significant difference. The availability of the operation theatres is much higher at AIIMS than in Japan, whereas CT scans is almost inaccessible for trauma patients in India because of the large number of CT examination requests from all hospital departments.

The following is one of the cases during the second group's stay at JPNATC. A male patient in his thirties who was shot in the back was taken to the AIIMS trauma centre by a relative. The patient was in a state of shock. A triage officer decided that the patient was

hemodynamically unstable. Trauma surgeons then started initial resuscitation. As the operation proceeded, Focused Assessment with Sonography for Trauma (FAST) revealed that the patient's condition was a pericardial tamponade. Then the patient was shifted to the operation theatre, and an emergency thoracotomy was conducted. The length of time between arrival and thoracotomy was only 16 minutes.

The findings and lessons learned by the second group of Japanese surgeons is as follows:

a. Team cooperation

It is vital to develop a good relationship and maintain communication between trauma experts and the anaesthesiology team in the operation theatre to ensure that emergency operations are performed well. Japan's trauma experts can learn from the excellent teamwork at JPNATC including the flow of initial assessment, resuscitation, operation, intensive care, re-operation, ward management, and so on. Japan's surgeons, anaesthesiologists, and nurses are encouraged to maximise their participation in this programme and contribute to improving trauma treatment in Japan through a strong partnership with the AIIMS.

b. Techniques in trauma surgery

Experience treating vascular injury is essential for the trauma surgeons because quickly repairing vascular damage to restore blood flow through or around blocked arteries (known as reperfusion) is critical for trauma surgery. Compared to trauma surgeons in Japan, trauma surgeons in India are required to cover a wide range of operations including treatment of vascular injuries. Japan's trauma surgeons rarely have opportunities to treat, especially in the field of vascular and limb injuries.

c. Transcatheter arterial embolisation

Transcatheter arterial embolisation (TAE) is a haemostatic procedure widely used by the trauma surgeons in Japan. It does not require open surgery and is therefore less invasive, it is appropriate for either hemodynamically stable or unstable patients, and likely decreases morbidity and improves trauma care outcomes. Currently, it is rarely used at JPNATC. Increased exchanges in treatment experience related to interventional radiology techniques such as TAE could thus contribute to improving trauma management in India.

d. Older patients

Japan is the most aged country in the world and Japan's trauma surgeons are highly experienced in treating older trauma patients. India's trauma surgeons could thus benefit from Japanese surgeons' knowledge of patient management and medical therapy related to older trauma patients.

e. Training for trauma surgeons at JPNATC

In both India and Japan, trauma surgeons conduct daily clinical rounds, weekly case presentations, and semi-weekly surgical and radiology conferences. However, especially in India, the training curriculum for trauma surgeons is designed and created in trauma centres. Trauma surgeon residents rotate through neurosurgery, orthopaedics, cardiovascular surgery, and plastic surgery so they gain practical and well-rounded knowledge and skills. The treatment of trauma patients in emergency departments begins with an initial assessment and resuscitation. Job rotation experience at emergency departments is mandatory for the trauma surgery residents. This clinical training system and its curriculum at JPNATC provide excellent opportunities for trauma surgeons to acquire experience in managing trauma patients from start to finish and in a wide variety of cases.

f. Equipment

Shock is a critical condition brought on by a sudden drop in blood flow through the body. Shock may result from trauma, heatstroke, blood loss, an allergic reaction, severe infection, poisoning, severe burns, or other causes. When a trauma patient is in shock, surgeons need to check the physical condition of trauma patients in a limited amount of time.

CT scans can greatly facilitate quick examinations and potentially reduce the number of invasive therapies using precise information on the patient's condition. In Japan, some hospitals place a CT scan machine in their emergency room (ER) called a hybrid ER system and in their operation theatre (OT) called a hybrid OT system. In India, trauma surgeons have to deal with many trauma cases in the emergency department within a short period of time but CT scans are not readily available. It may be challenging to place CT scan machines in the emergency department in India at the moment, but it will probably be possible in the future.

If trauma centres in India were to have CT scan machines in their OT, a variety of non-surgical management techniques, including interventional radiology and TAE, would be available and contribute significantly to trauma treatment in the country. By utilising a hybrid OT system, surgeons would be able to conduct surgical procedures and interventional-radiological procedures simultaneously. This technique of combining trauma surgery and interventional radiology can improve mortality rates for trauma patients in India.

The possibility of non-surgical management (including interventional radiology) was raised by Japanese trauma surgeons after experiencing a high volume of trauma patients and surgery during their training at JPNATC. Collaboration in this area could contribute to optimising healthcare resources and improving India's healthcare system.

Chapter 4

Conclusions and Prospects

In the course of implementing this project, Japanese associations confirmed that the project can contribute to improving trauma and medical care in both India and Japan. From the point of view of Japanese associations, Japanese surgeons' participation in the treatment of a large number of trauma patients was extremely valuable. They witnessed first-hand how patients in India were quickly brought to operation theatres and surgical treatments started immediately. In most Japanese institution, even in emergency and critical care medical centres, it is very difficult to start operation in such a short time after a patient's arrival. In addition, surgical procedures at All India Institute of Medical Sciences (AIIMS) were highly educational for the Japanese surgeons. Their experiences will be very useful when treating their patients at their institutions in Japan.

Meanwhile, less invasive treatment techniques, such as interventional radiology (IVR) and resuscitative endovascular balloon occlusion of the aorta (REBOA) are still uncommon at AIIMS. Since Japanese trauma surgeons have handled many cases involving IVR, they can share their experiences with AIIMS' surgeons and contribute to widening the treatment options available for trauma patients in India. In addition, Japanese associations have designed off-the-job training courses which include educational materials, management and organisation skills training components, and instructor list that could be very valuable for trauma surgeons in India.

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