# Our Brain Death and Organ Donation Experience: Over 12 Years

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ABSTRACT

Purpose. Nowadays, as the number of patients waiting for organ transplant is increasing, it is important to diagnose brain death in intensive care units and to provide good donor care. We aimed to share our experience of donor care with the diagnosis of brain death in our clinic.

Material and method. One hundred and fifty-one patients diagnosed in our clinic with brain death between June 2006 to 2018 were studied retrospectively.

Findings. The mean age of the 151 patients was 46.6 (1–89) years. Fifty-seven (37.7%) of the 151 patients' families accepted donation. Ten out of 57 patients could not be organ donors for medical reasons. Eighty-four kidneys, 7 hearts, and 40 livers were transplanted to the patients. When the diagnosis at admission to the intensive care unit was examined, it was found that the most common diagnosis was intracranial hemorrhage (36.8%), followed by head trauma (21.05%), drowning in water (3.5%), and firearm injury (3.5%). The apnea test was applied to all cases, but 17 patients could not complete the apnea test. In order to support the diagnosis of brain death, in 63% of patients (n = 95) radiological methods were performed. Cranial computed tomography angiography was performed as a radiological method. All cases were found to have received at least 1 inotropic support. We used dopamine in 41 patients, noradrenaline in 36 patients, dobutamine in 8 patients, and adrenaline in 3 patients. During the 12 months when the organ transplant coordinator was not on duty, there were no organ donors. It is important to maintain an organ and tissue transplant coordinator and an intensive care unit team for organ donation.

Conclusion. In order to increase the cadaver donor pool, it is necessary to increase the number of brain death diagnoses and decrease the rate of family rejection. Therefore, patients with poor neurologic prognosis should be carefully monitored for brain death. Successful family discussions by an experienced and trained organ transplant coordinator should try to increase donation rates by emphasizing the importance of organ donation and the fact that brain death is a real death.

ORGAN transplants are performed from live donors or cadavers. Cadavers are the most important resource for organ supply. Advances in transplantation and the increasing number of patients waiting for transplantation make the transplantation of organs from cadavers very important [1]. Since donor resources are very limited, organ transplants from cadavers are practiced in Turkey. On November 3, 1975, the first kidney transplantation with a donor kidney, was performed in Turkey, and on December 8, 1988, the first liver transplant from a donor occurred. The heart, pancreas, lung, small intestine, and cornea are only available from cadavers. Delays in early recognition of potential donors and brain death, and inadequate donor

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**Table 1. Demographic and Clinical Treatment Data for the Donors**

| | | Sex | | Inotrop | | | |
|---|---|---|---|---|---|---|---|
| Y | Meanage | M | F | Dopamine | Dobutamine | Noradrenaline | Adrenaline |
| 2006 | – | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - |
| 2008 | 3 | 1 | - | 1 | - | - | - |
| 2009 | 32.5 | 1 | 1 | 2 | - | - | - |
| 2010 | - | - | - | - | - | - | - |
| 2011 | 29 | - | 3 | 3 | - | 1 | - |
| 2012 | 54 | 7 | 1 | 8 | 1 | - | 1 |
| 2013 | 54.4 | 4 | 1 | 3 | - | 5 | - |
| 2014 | 27.5 | 2 | 5 | 2 | - | 2 | - |
| 2015 | 71.6 | 1 | 2 | 2 | - | 1 | - |
| 2016 | 40.8 | 5 | 2 | 5 | 2 | 6 | - |
| 2017 | 44 | 9 | 6 | 6 | 4 | 14 | 1 |
| 2018 | 53.8 | 6 | 5 | 9 | 1 | 7 | 2 |
| Total | 46.6 | 36 | 26 | 41 | 8 | 36 | 4 |

care are significant causes of donor source problems. Brain death is the irreversible loss of all activities of the brain, brain stem, and cerebellum [2]. We use these criteria for brain death: no response to stimuli, no spontaneous breathing or movement, absence of brain stem and spinal reflexes, lack of drug use that suppresses the central nervous system, absence of hypothermia (<32.2°C), and no change in test results after 24 hours (assessments of brain stem reflexes and the apnea test). A confirmatory test was used to assess brain circulation for cases diagnosed with brain death, and, if this test was consistent with brain death, no additional 24 hours were expected for the second neurologic examination.

## MATERIAL AND METHOD

One hundred and fifty-one patients diagnosed with brain death in our clinic between June 2006 to 2018 were studied retrospectively. Demographic characteristics such as age, sex, hospitalization and additional tests, family organ donation rate, donor rate, number of removed organs, and inotropic treatments were recorded.

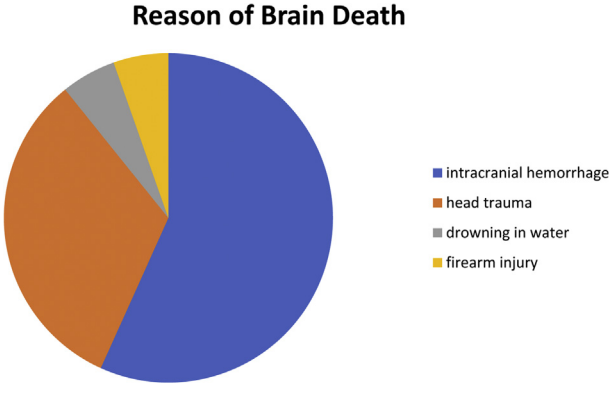


**Fig 1.** Cause of brain death.

## FINDINGS

The demographic and clinical treatment data for the donors is shown in Table 1. The mean age of the 151 cases whose records were examined was 46.6 (1–89). Fifty-seven (37.7%) of the 151 cases accepted family donations. Ten of 57 cases were not included for medical reasons. From 47 cases, 84 kidneys, 7 hearts, and 40 livers were removed for transplantation. When the diagnoses at admission to the intensive care unit were examined, it was found that the most common diagnosis was intracranial hemorrhage (36.8%), followed by head trauma (21.05%), drowning in water (3.5%), and firearm injury (3.5%) (Fig 1). The apnea test was applied to all cases, but the test could not be completed in all cases, because 17 patients could not tolerate apnea testing. The most common auxiliary test was computed tomography angiography (63%). All patients received at least 1 inotropic support. Forty-one patients received dopamine support, 36 cases received noradrenaline support, 8 cases received dobutamine support, and 3 cases received adrenaline support (Table 1). No donor organs were issued in 2010, when the organ transplant coordinator was not on duty.

## DISCUSSION

In our study, patients, who were diagnosed with brain death between 2006 to 2018, were examined. A total of 151 cases of brain death were identified and the total number of donations was 57 (37.7%). According to the data of 2016 Spain had the highest rate of deceased organ donation among select OEDC countries with 43.8 people per million population. The rate in Turkey was 7.1 people per million [3]. Religious, cultural, and legal reasons; the lack of adequate infrastructure and resources are the main reasons behind the inability to use this lifesaving and life-improving treatment. When the hospitalization of the patients diagnosed with brain death was examined, trauma (21.05%) and intracranial hemorrhage (36.8%) were found to be the highest rate in our study as in similar studies [1–4]. In our

**Table 2. Brain Death and Number of Donors Per Year**

| | Brain death (n) | Organ donation (n) | Ratio (%) | Donated organs | Transplanted organs |
|---|---|---|---|---|---|
| 2006 | 2 | 0 | 0 | 0 | 0 |
| 2007 | 8 | 0 | 0 | 0 | 0 |
| 2008 | 11 | 1 | 9 | 2 kidneys 1 liver 1 heart | 2 kidneys 1 liver |
| 2009 | 17 | 2 | 11 | 4 kidneys 2 livers 2 hearts | 4 kidneys 2 livers |
| 2010 | 5 | 0 | 0 | 0 | 0 |
| 2011 | 5 | 3 | 60 | 6 kidneys 3 livers 3 hearts | 4 kidneys 2 livers |
| 2012 | 11 | 8 | 72 | 16 kidneys 8 livers 8 hearts | 12 kidneys 7 livers 1 heart |
| 2013 | 13 | 5 | 38.4 | 10 kidneys 5 livers 5 hearts | 8 kidneys 3 livers 1 heart |
| 2014 | 7 | 2 | 28.5 | 4 kidneys 2 livers 2 hearts | 4 kidneys 2 livers |
| 2015 | 12 | 3 | 25 | 6 kidneys 3 livers 3 hearts | 4kidneys 3 livers 1 heart |
| 2016 | 14 | 7 | 50 | 14 kidneys 7 livers 7 hearts | 8 kidneys 4 livers 1 heart |
| 2017 | 31 | 15 | 48.3 | 30 kidneys 15 livers 15 hearts | 24 kidneys 10 livers 2 hearts |
| 2018 | 15 | 11 | 73.3 | 22 kidneys 11 livers 11 hearts | 14 kidneys 6 livers 1 heart |

study, the mean age of cases with brain death was found to be 46.6, similar to other studies [4,5].

In two different studies conducted in Turkey, the family approval rate was 34.2% and 40% [4,6]. In our study, we received 37.7% family approval. When the number of brain deaths and the number of donors are examined, it is observed that these numbers increase as the experience increases (Table 2). According to Ministry of Health data, 1587 brain deaths were reported in 2014 and 364 of these cases became donors. In 2015, 472 of the 1969 brain death cases were reported to be donors. Turkey seems to be the average of 22 to 24%. Our donor rate was higher than these data. In 2017, our hospital ranked first in Turkey for the number of donors.

No donor was issued in 2010 when the organ transplant coordinator was not on duty. The organ and tissue transplantation coordinator for donor removal and the maintenance of the intensive care team are important.

Organ donation is an important health problem for our country. Only kidney and liver can be taken from live donors. The most important issue with organ donation in Turkey is the death of patients without the diagnosis of brain death. The reason for not being diagnosed may be the lack of information or the hesitancy of physicians to diagnose brain death. International standardization has been achieved for the diagnostic criteria of brain death. There is a need for an effective team to diagnose brain death. Many hospitals aim to advance the diagnostic process effectively and quickly by means of specially appointed coordinator. In the study of Kıraklı et al [7], when the families of organ donors were interviewed, 36% reported that they looked positive previously, while 64% attributed this to the influence of the coordinator. Therefore, it is very important that organ transplant coordinators, who will receive family approval, are trained and experienced. As the diagnosis of brain death increases, the number of potential organ donors will increase.

## CONCLUSION

In order to increase the donor pool from cadavers, the detection of brain death should be increased, and the rate of family rejection should be reduced. Patients with poor neurologic prognosis should be carefully monitored for brain death. Successful family interviews by an experienced and trained organ transplant coordinator emphasizes that brain death is a real death, and the importance of organ donation should be emphasized. Recognition and acknowledgment of brain death should be 1 of the prioritized goals of raising awareness among health care professionals and the public about the support and funding of organ donors to improve the number and quality of supporting bodies.

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