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The Effect of Potential Donor Monitoring on Early Diagnosis of Brain Death

Potansiyel Donör Takibinin Beyin Ölümü Tanısının Erken Konulmasına Etkisi

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This study was presented as a poster at ISODP Congress, September 6-9, 2017, Geneva, Switzerland.

ABSTRACT Objective: Daily monitoring of potential organ donors among patients hospitalized in intensive care units has been performed since May 2015 in our university hospital. In this study, we aimed to investigate the effect of daily monitoring of potential organ donors on diagnosing brain death. **Material and Methods:** The study was conducted retrospectively by investigating the records of Organ Transplantation Coordination Office of Aydın Adnan Menderes University Training and Research Hospital between the years of 2010 and 2017, with the permission of the local ethics committee. The research data were evaluated by the Spearman correlation analysis. The level of statistical significance was considered as $p<0.05$. **Results:** No statistically significant differences were determined among the years regarding the number of brain deaths. **Conclusion:** Even though patients with the potential of being an organ donor were being monitored daily, no increase was determined in the number of patients diagnosed with brain death and the number of organ donors. To increase the cadaveric organ transplantation rate, which is low in our country, and for preservation of donor organs, raising the in-hospital communication, and early diagnosis of brain death are essential. We have the opinion that, although we were not able to determine the short-term beneficial results of daily potential organ donor visits that we have been continuing with this purpose, it will be useful in the long-term.

Keywords: Brain death; critical care

ÖZET Amaç: Üniversitemiz hastanesinde Mayıs 2015 tarihinden itibaren yoğun bakımlarda yatan hastalardan organ verebilme potansiyeli olan hastaların günlük izlenmesine başlanmıştır. Bu çalışmada potansiyel donörlerin günlük takiplerinin beyin ölümü tanısına etkisinin araştırılması amaçlanmıştır. **Gereç ve Yöntemler:** Çalışma yerel etik kurul izniyle 2010-2017 yılları arasında, Aydın Adnan Menderes Üniversitesi Uygulama ve Araştırma Hastanesi Organ Nakil Koordinatörlüğü kayıtları incelenerek retrospektif olarak yapılmıştır. Araştırmanın verileri Spearman korelasyon analizi ile değerlendirilmiştir. Verilerin analizinde önem düzeyi $p<0,05$ olarak kabul edilmiştir. **Bulgular:** Yıllara göre beyin ölümü sayısında anlamlı bir fark saptanmamıştır. **Sonuç:** Organ vericisi olma potansiyeli olan hastaların günlük izlenmesine karşın beyin ölümü tanısında ve donör sayısında bir artış olmamıştır. Ülkemizde düşük olan kadavradan nakil oranlarının arttırılmasında; hastane içi iletişimin arttırılması ve organ korunması için erken tanı konması önemlidir. Bu amaçla hastanemizde devam ettiğimiz günlük potansiyel donör vizitlerinin kısa dönemde sonuçlarını göremesek de uzun vadede etkili olacağı görüşündeyiz.

Anahtar Kelimeler: Beyin ölümü; kritik bakım

Even though the number of patients waiting for organ transplantation has been increasing in recent years, the number of transplanted organs is insufficient because of the small number of cadaveric organ donations. For this reason, cases of brain death should not be left undiagnosed. It should be kept in mind that the medical condition of patients hospitalized in intensive care units would deteriorate and they might

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be potential organ donors. The potential donor was described as the absence of cranial nerve reflexes in patients who had encountered brain injury and with a Glasgow Coma Scale score of less than 4 even though no sedation was performed.[1] It was considered that in our hospital involving 98 intensive care beds (92 adult, 6 pediatric), these cases might have been missed to be diagnosed due to their small number. Until 2015, the brain death monitoring process was being initiated by the physician responsible for the patient informing the coordinator for organ transplantation. From that time, the nurses working in the Organ Transplantation Coordination Office started daily monitoring all patients hospitalized in intensive care units and with GCS score below 7 as potential donors and informing the physician-members of the Brain Death Committee when the GCS score dropped below 5. When the committee has considered that it was necessary, investigation for the presence of brain death has been performed in monitored patients when the GCS score dropped to 3. When brain death has been determined to be present, necessary treatments are initiated for organ preservation, and the organ donation issue is discussed with the relatives of the patient.

In this study, we aimed to determine how many cases had been diagnosed with brain death between January 2010 and February 2017, how many patients had been monitored in potential donor visits, and to investigate whether potential donor visits had been affecting the diagnosis of brain death.

MATERIAL AND METHODS

The study was conducted retrospectively by investigating the records of the Organ Transplantation Coordination Office of Aydın Adnan Menderes University Training and Research Hospital between the years of 2010 and 2017. Ethics committee approval was received from Adnan Menderes University on 23.03.2017 (Ethics committee number: 2017-1118). The records that belonged to both the periods in which potential donor visits had not been performed (January 2010-May 2015) and it had been performed (May 2015-February 2017) were investigated. The number of patients who had been hospitalized, lost, investigated for brain death, diagnosed with brain death, and had become organ donor were determined. The research data were evaluated by the Spearman correlation analysis. The level of statistical significance was considered as $p<0.05$.

The study was conducted in accordance with the Declaration of Helsinki Principles.

RESULTS

A total of eight patients were found to be diagnosed with brain death between January 2010 and February 2017 in our hospital (Table 1). Within approximately two years that daily visits were being conducted, a total of 7683 patients were monitored in intensive care units and 1665 of them died. By daily potential donor visits, a total of 48 patients were followed, the apnea test and transcranial Doppler ultrasonography were performed in 8 of them, in 3 of which the diagnosis of brain death was made, and the organs were taken (Table 2).

In statistical analysis, no significant differences were determined among the years regarding the number of brain deaths. (Spearman correlation coefficient) (r=-0.386; p=0.345). No significant difference was found to be present between the periods in which potential donor visits had been and had not been performed (p=0.659).

TABLE 1: The results according to the years.

Years	2010	2011	2012	2013	2014	2015	2016	2017
Number of brain deaths	2	1	1	1	-	1	2	-
Number of donors	2	-	1	-	-	1	2	-

TABLE 2: The results of potential donor visits.

Years	2015 (After May)	2016	2017 (January-February)
Number of monitored potential donors	26	14	8
Number of patients that apnea test and transcranial Doppler USG were performed	3	3	2
Number of brain deaths and donors	1	2	_

DISCUSSION

The first step during the organ donation process in cases of brain death is the identification of suspected cases with brain death and monitoring closely. Studies reported that with prolongation of the diagnostic process, donation rate decreased from 57% to 45%.[2]

In their study, Beigee et al. tried to intervene actively for identification of brain death, and for this purpose, they converted their follow-up by phone communication thrice weekly to daily phone communication and eventually to daily intensive care visits.[3] As a result, they increased their number of donors by 53% at the end of one year. Although daily potential donor visits had been initiated in our hospital almost at the same time with them, such positive results could not be achieved. The patient profile in our intensive care units consisting of either complicated patients with multiple organ failure or with hypoxic-ischemic encephalopathy following cardiopulmonary resuscitation might be considered as its primary cause. This suggestion was derived due to the small number of monitored patients with GCS score lower than 7. Trauma patients referred to our intensive care units from other hospitals in our province consist of the patients with high survival probability, even though they are complex. The higher number of cases with brain death in other hospitals in our district when compared to our hospital supports this hypothesis (Table 3). However, for identification of the actual causes of this situation, prospective studies should be conducted. Various studies are planned on this subject.

TABLE 3: The distribution of brain death diagnosis in Aydın province according to years.[4]

Years	2011	2012	2013	2014	2015	2016	2017	2018
Number of brain deaths	19	21	22	36	38	39	35	27

CONCLUSION

In our study, no significant difference was found among years regarding the number of brain deaths. Besides, no significant difference was found among the patients according to years after the initiation of visits. Even though the total number of beds in intensive care units is high in our hospital, the number of patients diagnosed with brain death is small.

For increasing the rate of cadaveric organ transplantation in our country and for organ preservation, improving the in-hospital communication and diagnosing brain death early are essential. Although we were not able to see the short-term results of ongoing daily potential donor visits with this purpose, we have the opinion that it will be useful in the long-term. However, for identification of the actual causes of the scarcity of brain death diagnosis, prospective studies are required. Various studies are planned on this subject.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Design: *İbrahim Kurt;* ***Control/Supervision:*** *Dilek Acar;* ***Data Collection and/or Processing:*** *Bilge Banu Taşdemir Mecit;* ***Analysis and/or Interpretation:*** *Ayça Özkul;* ***Literature Review:*** *İbrahim Kurt;* ***Writing the Article:*** *Bilge Banu Taşdemir Mecit;* ***Critical Review:*** *İbrahim Kurt;* ***References and Fundings:*** *Dilek Acar;* ***Materials:*** *İbrahim Kurt.*

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