



ORIGINAL RESEARCH

Evaluation of Obstetric Patient Transfers by Helicopter in Turkey

Asiye Uzun, MD¹, Eren Usul, MD^{2*}, Gülşah Çıkrıkçı Işık, MD³, Semih Korkut, MD⁴

¹Department of Obstetrics and Gynecology, Medipol Teaching and Research Hospital, Turkey

²Sincan Dr Nafiz Körez State Hospital, Emergency Service, Turkey

³Department of Emergency Medicine, Ankara Keçiören Education and Training Hospital, University of Health Sciences, Turkey

⁴Department of Emergency Medicine, Kartal Dr Lütfi Kırdar Training and Research Hospital, University of Health Sciences, Turkey

*Corresponding author: Eren USUL, MD, Sincan Dr Nafiz Körez State Hospital, Emergency Service, Tevfik İleri Mahallesi, Yıldırım Bulvarı, Leman Sokak, Sarp Sitesi 6/34, Ankara, Turkey, Tel: 0090-505-8004204



Abstract

Aims: Air ambulance services, which began in 2008 in our country, have become increasingly widespread. Today, there are command centers in 17 cities, and helicopter ambulances are preferably provided during the day, while air craft ambulances are used at night. The aim of the present study was to examine the characteristics of obstetric patient transfers by helicopter ambulance throughout Turkey in 2020.

Materials and methods: This study was started after receiving permission from the Turkish Ministry of Health, and all obstetric cases transported by helicopter ambulance throughout the country between 01.01.2020 and 31.12.2020 were retrospectively examined and included in the study.

Results: The mean age was 27.46 ± 5.98 (mean \pm SD), and the three most common conditions were non-complicated pregnancy ($n = 9$), preeclampsia ($n = 8$), and early membrane rupture ($n = 5$). Regarding the flights, 13 (34.2%) took place in the spring, 13 (34.2%) in the summer, 9 (23.7%) in the autumn, and 3 (7.9%) in the winter. The median flight time was 63 minutes (IQR: 52.50-78.75). If the same distances had been taken by road, the estimated transfer time would have been 96 minutes (IQR: 87.75-124.5).

Discussion: Although the air transfer of high-risk obstetric patients has been carried out for more than four decades, there are still controversial headlines on this topic. Studies have shown that high-risk newborns are more likely to survive when they are born in a place with a perinatal care center compared to local births and subsequent transfers. This data is similar to the data in the present study. Meanwhile, a report on all existing studies in 2000 and beyond showed

that, compared to land transfers, helicopter transfers generally led to better results in terms of survival rates and treatment termination, and patients reached their health care facilities faster and time interval up to final treatment improved.

Conclusion: The medical transportation of high-risk obstetric patients can be performed safely by air. Furthermore, air transfers help reduce maternal mortality and morbidity by reducing the time until patients receive precise treatment.

Keywords

Pre-hospital, Obstetric, Helicopter, Transfers

Introduction

In a medical emergency, it is critical to get the patient to the center where the intervention will be performed as quickly as possible [1]. Currently, one out of every six women in poor parts of the world dies during pregnancy or childbirth, and maternal mortality is especially clustered during labor and the early postpartum period [2]. A study from Tanzania reported that a weighted proportion of stillbirths and perinatal deaths occurred because patients were unable to reach a health center or had difficulties during transfer [3]. Therefore, the fact that appropriate patient referrals in emergency obstetric services will minimize maternal and perinatal mortality risks cannot be believed. To address these risks, the aerial transfer of high-risk obstetric patients has been practiced all over the world for many years [4].

Air transport applications for emergency transfer have reached an important point, and helicopter or aircraft ambulances are now used for this purpose [5]. The first aerial medical transfer was made by balloon during the siege of Paris in 1870, while the first aircraft ambulances were used during World War II [6,7]. Air ambulance services, which began in 2008 in Turkey, have become increasingly widespread and nowadays, with the command centers established in 17 different cities, patients who are thought to need air transfer by the chief physician's decision, transferred preferably by ambulance helicopters during daytime and by ambulance aircraft at night [8]. Helicopter flights can be made when meteorological conditions allow and those transfers are supported by the government finance. An air ambulance is an extremely important patient transfer tool, especially in the eastern provinces of Turkey, which have difficult geography and harsh climatic conditions and are far from the Health Center [9]. The aim of the present study was to examine the characteristics of obstetric patient transfers by helicopter ambulance throughout Turkey in 2020.

Materials and Methods

This study was started after receiving permission from the Turkish Ministry of Health, and all obstetric cases transported by helicopter ambulance throughout the country between 01.01.2020 and 31.12.2020 were retrospectively examined and included in the study. Patient data and flight data were obtained from the emergency medical services automation system (ASOS) and the flight records of the Turkish Ministry of Health. The medical variables were age, diagnosis, reason for referral, medical intervention(s) required during flight, and mortality due to the reason for referral. The flight-related variables were the season in which the flight took place, the departure and destination points, and the duration of the flight. Variables about how long the transfer would have taken by road were also examined, including the journey time, which was estimated using the Google Maps® app. All variables were recorded in the prepared working form.

Data analysis

The data was analyzed using IBM SPSS Statistics for Windows, version 20.0 (IBM Corp., Armonk, NY, 2011). During the statistical analysis process, mean \pm standard deviation or median (December 25-75 between quarters) were calculated for the numerical data, and frequency and percentages were calculated for the categorical data.

Results

A total of 38 pregnant women, who were transported by helicopter ambulance, were studied. The mean age was 27.46 ± 5.98 (mean \pm SD), and the three most common conditions were non-complicated pregnancy

Table 1: Medical variables for obstetric cases transferred by helicopter ambulance (n = 38).

| Age | 27.46 \pm 5.98 |
|---|------------------|
| Diagnosis | |
| Non-complicated pregnancy | 9 |
| Preeclampsia | 8 |
| Erkan membrane rupture | 5 |
| Placenta detachment | 3 |
| Active labor | 3 |
| Low threat | 2 |
| High-risk pregnancy | 1 |
| Stillbirth | 1 |
| Acute fetal distress | 1 |
| Abdominal pregnancy | 1 |
| Uterine rupture | 1 |
| Birth with meconium | 1 |
| Ventricular tachycardia in pregnancy | 1 |
| Multiple pregnancy | 1 |
| Transfer indication | |
| Specialist physician needed | 21 |
| Advanced specialist physician needed | 8 |
| Intensive care needed | 5 |
| Lack of medical equipment | 2 |
| Incubator needed | 1 |
| Further examination treatment needed | 1 |
| Urgent need for medical attention during transfer | 0 |
| Maternal mortality | 0 |

*Variables are given as median (interquartile range) or number of cases.

(n = 9), preeclampsia (n = 8), and early membrane rupture (n = 5). Almost all of the patients' transfer indications were due to the need for a specialist physician (n = 21) or an advanced specialist physician (n = 8). None of the woman required additional emergency medical attention except for routine vital sign monitoring during the flight. Maternal mortality was not observed during or after the referrals (Table 1).

Regarding the flights, 13 (34.2%) took place in the spring, 13 (34.2%) in the summer, 9 (23.7%) in the autumn, and 3 (7.9%) in the winter. The provinces of Diyarbakir (n = 10), Van (n = 5), and Erzurum (n = 4) had the most referrals. One case was an inter-provincial referral from an educational research hospital to a university hospital, which was made because specialists were needed. Two cases, which were in February in the eastern provinces (Muş and Erzurum), were from hamlets to their associated provincial centers. The remaining referrals took place from district government hospitals to their associated provincial centers.

The median flight time was 63 minutes (IQR: 52.50-78.75). If the same distances had been taken by road, the estimated transfer time would have been 96 minutes (IQR: 87.75-124.5) (Table 2).

Table 2: Transport-related variables for obstetric cases transferred by helicopter ambulance.

| | |
|--|---------------------------------|
| Season | |
| Spring | 13 |
| Summer | 13 |
| Autumn | 9 |
| Winter | 3 |
| Regions | |
| Inter-provincial | 1 |
| From the hamlet to the provincial center | 2 |
| From the county to the city center | 34 |
| From the district to the provincial center | 1 |
| Helicopter flight time | 63 minutes (IQR 52.50-78.75) |
| Estimated highway transfer time | 96 minutes (IQR 87.75-124.5) |

*Variables are given as median (interquartile range) or number of cases

Discussion

Every day, thousands of people around the world die from road accidents, heart attacks, natural disasters, and epidemics. The most important ways to reduce mortality and morbidity in field cases are to increase the response rate of the emergency assistance system and decrease the time required to transfer cases to hospitals [10]. Helicopter ambulance services have been actively used in rural and urban areas to improve transfer processes and are important parts of modern emergency care services [11].

In a statement made by the Turkish Ministry of Health, an air ambulance is recommended if it takes 30 minutes or more to arrive at the scene by ground ambulance [8]. When transferring patients by air, attention should be paid to the process of taking the patient from the scene, preparing the helicopter, and transferring the patient from the helipad to the emergency department [12]. The most notable disadvantages of helicopter ambulances are adverse weather conditions and difficult geographical conditions [13]. In the present study, only three of the transfers were made during winter. Medical air transfers should target the nearest equipped hospital; choosing the right hospital will reduce mortality and morbidity [14]. Almost all of studied transfers took place from districts and hamlets to fully equipped hospitals in their associated provincial centers, and no mortality was observed. In our study, it was observed that some non-complicated pregnant women were transferred by helicopter. The reason for this might be that the general practitioners in the hamlet did not want to take the risks that might occur during the delivery in these pregnancies that were not followed up, and they wanted to refer the patients to the obstetrician in the fastest way possible due to their desire to avoid malpractice situations.

Although the air transfer of high-risk obstetric patients has been carried out for more than four decades, there are still controversial headlines on this topic. Studies have shown that high-risk newborns are more likely to survive when they are born in a place with a perinatal care center compared to local births and subsequent transfers [15]. However, concerns with obstetric air transfers include emergency delivery during flight, insufficient fetal monitoring, and inexperience [4]. As for complications with helicopter ambulances, it was observed that patients initially had nausea; however, it disappeared during flight [16]. No studies of the fetal or maternal effects of flight physiology or helicopter vibrations were found in the literature. In one study, the most common causes for helicopter transfers of obstetric cases were preterm birth, premature rupture of membranes, cervical insufficiency, and preeclampsia [16]. This data is similar to the data in the present study. Meanwhile, a report on all existing studies in 2000 and beyond showed that, compared to land transfers, helicopter transfers generally led to better results in terms of survival rates and treatment termination, and patients reached their health care facilities faster and time interval up to final treatment [17]. In obstetric cases, air transfers can be performed safely even in the last weeks of pregnancy [4].

Conclusion

The medical transportation of high-risk obstetric patients can be performed safely by air. Furthermore, air transfers help reduce maternal mortality and morbidity by reducing the time until patients receive precise treatment.

References

1. Gray A, Gill S, Airey M, Williams R (2003) Descriptive epidemiology of adult critical care transfers from the emergency department. *Emerg Med J* 20: 242-246.
2. Ronsmans C, Graham WJ, Lancet Maternal Survival Series Steering Group (2006) Maternal mortality: Who, when, where, and why. *Lancet* 30: 1189-200.
3. Mbaruku G, van Roosmalen J, Kimondo I, Bilango F, Bergström S (2009) Perinatal audit using the 3-delays model in western Tanzania. *Int J Gynaecol Obstet* 106: 85-88.
4. Jones AE, Summers RL, Deschamp C, Galli RL (2001) A national survey of the air medical transport of high-risk obstetric patients. *Air Med J* 20: 17-20.
5. Wong TW, Lau CC (2000) Profile and outcomes of patients transported to an accident and emergency department by helicopter: Prospective case series. *Hong Kong Med J* 6: 249-253.
6. Lam DM (1988) To pop a balloon: Aeromedical evacuation in the 1870 siege of Paris. *Aviat Space Environ Med* 59: 988-991.
7. Macnab AJ, Freeman J, Sun C (1995) Air evacuation: Costs, benefits, and priorities. *BC Med J* 37: 251-256.
8. <http://www.saglik.gov.tr>
9. Köse A, Köse B, Akpınar AA, Köksal Ö, Aydın Ş, et al.

- (2012) Characteristics of patients transferred by air: A descriptive epidemiologic study. *Turk J Med Sci* 42: 876-885.
10. Nogueira LC Jr, Pinto LR, Silva PM (2016) Reducing emergency medical service response time via the reallocation of ambulance bases. *Health Care Manag Sci* 19: 31-42.
 11. Mc Cowan CL, Swanson ER, Thomas F, Handrahan DL (2007) Outcomes of blunt trauma victims transported by HEMS from rural and urban scenes. *Prehosp Emerg Care* 11: 383-388.
 12. Caldow SJ, Parke TR, Graham CA, Munro PT (2005) Aero-medical retrieval to a university hospital emergency department in Scotland. *Emerg Med J* 22: 53-55.
 13. Leaman AM, Nutbeam T (2011) Trauma systems and medical helicopters in the UK. *Injury* 42: 12-14.
 14. Black JJ, Ward ME, Lockey DJ (2004) Appropriate use of helicopters to transport trauma patients from incident scene to hospital in the United Kingdom: An algorithm. *Emerg Med J* 21: 355-361.
 15. Merenstein GB, Pettett G, Woodall J, Hill JM (1977) An analysis of air transport results in the sick newborn II. Antenatal and neonatal referrals. *Am J Obstet Gynecol* 128: 520-525.
 16. Ohara M, Shimizu Y, Satoh H, Kasai T, Takano S, et al. (2008) Safety and usefulness of emergency maternal transport using helicopter. *J Obstet Gynaecol Res* 34: 189-194.
 17. Moga C, Harstall C (1995) Air ambulance transportation with capabilities to provide advanced life support. 2008. In: Database of Abstracts of Reviews of Effects (DARE): Quality-assessed Reviews [Internet]. York (UK): Centre for Reviews and Dissemination (UK).