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Is Obstetrics and Gynaecological Sonography Essential at a Field Hospital Set up? Thoughts After the Earthquake – Turkey, 1991¹

by

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ABSTRACT

AN ISRAELI DEFENSE FORCE (IDF) field hospital with an integral obstetrics department was functioning in the city of Adapazari from day 4 to day 14 after the 1999 earthquake disaster in Turkey. The city's obstetric and gynaecological facilities had been severely compromised by the earthquake and the IDF field hospital played a major role in this field.

The role of obstetric and gynaecological sonography in a field hospital in an earthquake disaster has not been previously discussed in the literature. In this paper, the main indications for field hospital obstetric and gynaecological sonography are described and the importance of this tool, in the context of a mass disaster with compromised local medical facilities, is discussed.

A total of 1205 patients were examined in the IDF field hospital during its 10 days of operation. A sonographic examination was performed on 71 of the 123 obstetric or gynaecological patients who were examined in the field hospital. The biophysical profile was the most common indication for the use of sonography, occurring in 50.7% of cases. Early pregnancy sonography was performed in 18.6% of all the patients. Although a vaginal probe was not available, we estimate that it could have assisted diagnosis in a further 29 cases. In 24 cases, the sonographic diagnosis eliminated the need for further referral. One emergency case was evacuated by helicopter and five others by ambulances to a tertiary care facility in Istanbul. The sonographic test also significantly improved the psychological status of the patients.

Sonography at the field hospital level serves to reduce the number of essential referrals, which may be difficult in disaster conditions for both the medical personnel and the patients. Although the cost of a portable ultrasound is signed if can't, its use for diagnostic and reassurance purposes is justified in this scenario. Sonography may also play a role in reducing the anxiety of pregnant women.

Keywords: Earthquake, field hospital, ultrasonography, pregnancy.

INTRODUCTION

A natural disaster has been defined as a disruption of human ecology that exceeds the capacity of the community to function normally. On August 17, 1999, at 03:04 am, an earthquake of 7.4 magnitudes on the Richter scale struck the Marmara region, one of the most populated areas of Turkey. The estimated number of casualties was 50,000, including 20,000 fatalities and a further 20,000 people missing.

The earthquake significantly damaged the infrastructure of the affected cities, including their health systems. Many local medical personnel were either injured or killed and the health facilities were badly damaged or destroyed, rendering the remaining medical staff largely ineffective. The Israeli Defense Forces sent a field hospital to the affected area in order to assist injured civilians and to substitute for some of the hospital facilities

and services that had been significantly damaged in the earthquake. The IDF field hospital commenced functioning on day four after the earthquake in Adapazari, the second most severely damaged city in Turkey.

One of the departments of the field hospital was Obstetrics and Gynaecology. The services offered by this department were mostly routine primary and secondary health care services, including operating facilities, which were not available in the local medical facilities in the first week after the earthquake.

Prior to the departure of the field hospital from Israel, the diagnostic role of ultrasound in post-earthquake setting was considered. A review of 'lessons learnt' from the recent IDF field hospital deployment in Macedonia, caring for the refugees of the Kosovo region, indicated that such an instrument is important. The aim of this paper is to describe the role of ultrasound for obstetrics in the field post-disaster and to recommend its use in the setup of a field hospital.

METHODS

The Obstetrics and Gynaecology facilities in Adapazari consisted of fully equipped departments in three hospitals: the Maternity and Neonatal Care Hospital, the Social Security Hospital and the State Hospital. These hospitals provided obstetrics and gynaecology services, including ultrasound, labor room and operating facilities. Other private primary care clinics formed part of the health system in Adapazari.

The assignment of the IDF team was to provide primary, secondary and tertiary medical services to the region until the local medical facilities had been restored and were able to provide medical care again. The field hospital offered a multidisciplinary structure, which enabled flexibility to fit the needs of a wide spectrum of disaster scenes. This reduced the need for a time-consuming process of tailoring the structure of the field hospital to the specific requirements of each disaster scenario prior to deployment. The Obstetrics and Gynaecology services provided a delivery suite, in and out-patient services, and ultrasound services.

The Ultrasound machine used was a portable Enraf Nonius Physioscan 100, manufactured in Holland. The machine had two transducers: a Linear 3.5 MHz and a curvilinear 5 MHz transducer. A transvaginal probe was not provided. The machine was encapsulated by bars, which reduced the chance of malfunction due to external trauma and made it more suitable for field purposes. The electricity for the machine was provided by a 220V generator and was not dependent on local electricity, which was not available in many parts of the city.

A random sample of 15 pregnant patients, who were about to have a sonographic test of their pregnancies, was selected to complete a short questionnaire. An English Turkish translator assisted the obstetrician in obtaining the responses. Most patients complied with the request to fill in the questionnaire. The questionnaire addressed, among other questions, the perceived emotional status of the women, on a 1 to 5 scale (1 - calm, 2 - not so calm, 3 - anxious, 4 - very anxious, 5 - extremely anxious), before and after the ultrasonographic examination.¹

RESULTS

The Obstetrics and Gynaecology department started admitting patients from day 4 after the earthquake. At that stage, the other medical facilities in Adapazari were largely non-functional. One hundred and twenty-three women were seen by the Obstetrics and Gynaecology department, out of a total of 1205 patients seen at the field hospital. The average age of the women was 26 years. Seventy-seven patients were pregnant, the gestational ages ranged between 5 and 41.5 weeks. Eighteen patients were in the first trimester of the pregnancy, 17 in the second trimester and 42 in the third trimester of pregnancy.

A sonographic examination was done in 71 patients (Table 1). The Biophysical profile (1-10 scale, 2 points for each one of the following parameters: foetal breathing movements, foetal movements, foetal tone, foetal reactivity, qualitative amniotic fluid volume) was the most common indication for the use of sonography in 36/71 (50.7%). Early pregnancy sonography was performed in 23 cases (18.6%). Although a vaginal probe was not available, we estimate that it could have assisted diagnosis in a further 29 cases. In particular, the probe would

have been useful for diagnosing early pregnancy, ascertaining foetal life in the early stages of pregnancy, diagnosing extrauterine pregnancy, assessing the placental site and associated pathology, and conducting early foetal anatomical surveys.

| The indication for sonography | Number of patients examined (%) | |
|-------------------------------|---------------------------------|---------------|
| Biophysical profile | 27 | (38%) |
| Biophysical and biometry | 9 | (12.7%) |
| Foetal heart rate and CRL | 23 | (32.4%) |
| Pelvic structures | 6 | (8.5%) |
| Foetal heart rate only | 4 | (5.6%) |
| Placental site &: pathology | 2 | (2.8%) |
| Total | 71 | (100%) |

TABLE 1: The distribution of indications for sonography in the IDF field hospital in Adapazari.

In 24 cases, the sonographic diagnosis eliminated the need for referral, including in cases involving the management of vaginal bleeding during pregnancy, management of decreased foetal movements, management of lower abdominal pain in women, diagnosis of spontaneous abortions, diagnosis of extrauterine pregnancy, and assessment of foetal wellbeing. The referral hospitals were in Istanbul or in Ankara. Because many roads were damaged during the earthquake, the travelling time was between four to ten hours. One emergency case was transferred by helicopter and five others were transferred by ambulance to a tertiary health care facility. The use of ultrasound allowed the scarce resources for patient evacuation to be prioritised and enabled the obstetrics and gynaecological services to be independent of the major health facilities. The use of ultrasound both saved the cost of 24 unwarranted air transfers of pregnant women to distant medical facilities and reduced the patient load on these facilities, facilities which were desperately needed to provide a wide range of services during the first days after the earthquake.

A short questionnaire was circulated among 15 pregnant patients who were about to have a sonographic test for their pregnancies. Nine graded their concerns as 'extremely anxious' on a scale of 1 to 5. After the sonographic test, ten of the fifteen patients said that they would define their current emotional status as 'calm' up to 'anxious'. Three patients who felt extremely anxious before conducting the ultrasonographic examination still remained extremely anxious after the test.

DISCUSSION

In the last several years, the IDF has deployed health personnel worldwide to mass casualty disasters. In the first deployments, the medical equipment was based on the standard trauma equipment of a military field hospital. Gradually, the equipment and medications have been modified for the civilian requirements and an ultrasound machine was introduced to address Obstetrics and Gynaecology requirements as well as other medical and surgical problems, such as abdominal trauma.³ The value of ultrasound as a screening tool was demonstrated in 12.8% of 400 mass casualty patients screened after the Armenian earthquake in 1981. A review of the literature, however, indicates that this is the first report of the use of Obstetrical and Gynaecological sonography in such a field hospital setup.

Mass disasters, such as an earthquake, may have adverse effects on reproductive outcome. Many women believe it may affect their pregnancy although usually, they do not base their belief on scientific studies. There have been several recent studies suggesting a correlation between mass casualty situations and adverse reproductive outcomes, including infertility, early pregnancy loss, stillbirths and serious developmental disabilities, such as cerebral palsy and mental retardation.⁸

On the 2nd of March 1985, an 8.9 Richter scale earthquake and a series of aftershocks occurred in Santiago, Chile. The characteristics of over 22,000 births registered in three public hospitals in the same year were reviewed. A significant increase in the rate of facial clefts was found, with an incidence of 2.01 per 1000 births compared to

1.6 per 1000 births in previous years. The increase was even greater in those born in September with 3.8 per 1000 births. The reason for this increase in clefting is unclear. Animal models of earthquakes have found that 19.8% of the newborn mice treated in a vibrator cage have developed cleft palates. These findings in mice support the stress hypothesis for the increase in cleft palate observed in humans. The increase in resorbed embryos in both strains also suggests an effect on stress. Apart from cleft lip, there is animal data that prenatal exposure to stress hormones affects the brain development.⁶

As well as being a useful diagnostic test for the care of pregnant women during mass casualty disasters, sonography has been potentially shown to reassure expectant mothers on one hand while raising the concern of others, depending on the clinical condition. Based on our limited data on mothers' concerns about their pregnancies following this mass disaster, sonographic screening of pregnant women, particularly showing the mothers foetal heartbeats on the screen, has a role in providing reassurance.

In conclusion, the indications for and extent of sonographic use for obstetrics and gynaecology in a field hospital following an earthquake disaster are described for the first time. The evaluation of foetal biophysical profile is the most common indication for the test. Sonography in the field serves to reduce the number of referrals, which are difficult to arrange in disaster conditions. Although the cost of a portable ultrasound is significant, the benefit of its use for diagnostic and reassurance purposes outweighs its cost. The women's common belief that severe anxiety may affect their reproductive outcome is supported by some clinical as well as animal studies. Sonography may also play a role in reducing the anxiety of pregnant women in a disaster situation.

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