CASE REPORT : TRAUMATIC BRAIN INJURY IN PREGNANCY

Muhammad Farhan Wibowo[1*], Indra Damayanti[2], Sigit Darmadi[2]
Faculty of Medicine, University of Jember, Indonesia[1] ,RSUD dr. Soeroto, Ngawi *Regency, East Java,* Indonesia[2]
**Corresponding Author :* farhannwibowoo@gmail.com

ABSTRAK
Cedera otak traumatik merupakan penyebab utama kecacatan dan kematian, dan bila terjadi pada wanita hamil, penanganan yang kompleks dan pertimbangan khusus harus diperhatikan. Tujuan untuk menjelaskan dan menganalisis kasus cedera otak traumatik pada kehamilan. Seorang perempuan berusia 41 tahun pasca kecelakaan lalu lintas datang dengan keluhan mual, muntah, pusing, nyeri perut, dan tidak sadarkan diri, pada pemeriksaan fisik ditemukan nyeri tekan epigastrium, hematoma frontal dan multiple excoriation vulnus. Pada CT scan kepala tidak ditemukan adanya perdarahan, pada pemeriksaan status obstetri ditemukan G3P2002 usia kehamilan 20/21 minggu, posisi kepala, primitua sekunder, usia > 35 tahun. Pasien menjalani penanganan trauma kepala dan perawatan kehamilan konservatif yang melibatkan manajemen multidisiplin. Pasien dengan cedera otak traumatik pada kehamilan, baik yang ringan maupun yang berat, dikaitkan dengan hasil maternal dan fetal yang buruk, oleh karena itu diperlukan manajemen multidisiplin yang komprehensif dan pemantauan intensif untuk mencapai hasil pasien yang baik.

Kata kunci **:** cedera otak traumatik, kehamilan, manajemen

ABSTRACT
Traumatic brain injury is a major cause of disability and death, and when it occurs in pregnant women, complex management and special considerations must be taken into account. Objective to explain and analyze the case of traumatic brain injury in pregnancy. A 41-year-old woman after a traffic accident came with complaints of nausea, vomiting, dizziness, abdominal pain, and was unconscious, physical examination found epigastric tenderness, frontal hematoma and multiple excoriation vulnus. CT scan of the head did not find any bleeding, obstetric status examination found G3P2002 gestational age 20/21 weeks, head position, secondary primitua, age> 35 years. The patient underwent head trauma management and conservative pregnancy care involving multidisciplinary management. Patients with traumatic brain injury in pregnancy whether mild or severe are associated with poor maternal and fetal outcomes, therefore comprehensive multidisciplinary management and intensive monitoring are required to achieve good patient outcomes.

Keywords ***:*** *traumatic brain injury, pregnancy, management*

INTRODUCTION

Traumatic brain injury (TBI) in pregnancy is a serious medical problem because it can affect the health of the mother and fetus, it is estimated that at least 20% of maternal deaths are caused by trauma. The most common traumas are motor vehicle accidents, falls, violence, and burns. In developing countries, TBI is one of the main factors causing non-obstetric deaths in pregnant women (Fauzi et al., 2023). Based on its severity, TBI is divided into mild, moderate, and severe. TBI in pregnant women can increase the risk of spontaneous abortion, premature rupture of membranes, preterm labor, uterine rupture, placental abruption, stillbirth and increase the rate of cesarean section. The fetal mortality rate ranges from 3.4 to 38 percent associated with placental abruption, maternal shock, and maternal death (Fauzi et al., 2023; Vaajala et al., 2023). Management of TBI in pregnancy is a challenge because it requires special handling and involves multidisciplinary in the hope of preventing death and morbidity

in the mother and fetus (Filippo et al., 2022; Haldar et al., 2023). Objective to explain and analyze the case of traumatic brain injury in pregnancy.

CASE

A 41-year-old woman G3P2002 came brought by her family after a traffic accident using a motorbike, the patient was riding the motorbike alone then fell, when the incident the patient fainted and was unconscious so she forgot the chronology, the patient complained of nausea and vomiting twice, when she arrived at the ER the patient complained of a dizzy head and stomach ache, other complaints such as bleeding from the birth canal were denied by the patient. The patient was married once at the age of 23 years, history of using contraceptive injections every 1 month, first day of last period: 07-08-2024, Estimated date of birth: 14-5-2025. From the physical examination, vital signs were found to be within normal limits, GCS 15, abdominal tenderness in the epigastric region, frontal hematoma and multiple vulnus excoriation on the extremities. From the examination of obstetric status, TFU was found 3 fingers below the navel, head position, fetal heart rate 152x/minute, no contractions.

In the supporting examination, the patient underwent a CT scan of the head, no bleeding was found, in the USG examination, K/T/H biometry was 20/21 weeks, EFW 473 grams, placenta posterior grade II and sufficient amniotic fluid. In the laboratory examination, the patient's HB was 10.6 g/dl and leukocytes 19.3x103/µL.

Figure 1. Ultrasound and CT Scan Findings

DISCUSSION

TBI in pregnancy is one of the main causes of non-obstetric death, especially in developing countries. Complex management requires special considerations for changes in the physiology and anatomy of pregnant women, such as teratogenicity in the administration of pharmacological therapy, diagnostic procedures using ionizing radiation, and intensive monitoring of the mother and fetus. Trauma that is considered mild in people in general, is not necessarily mild in pregnant women (Kho et al., 2018; Leach et al., 2020). In this case, a post-traffic accident patient came with complaints of being unconscious, nausea, vomiting, headaches and abdominal pain, the patient denied other complaints. Patients with TBI in pregnancy can experience various symptoms depending on the severity, in mild degrees there can be headaches, nausea, vomiting, blurred vision, and difficulty concentrating or remembering something. In more severe degrees there can be decreased consciousness, neurological deficits, seizures, unresponsiveness to coma. In pregnant women, it can also have an impact on the fetus, namely uterine contractions so that there is a threat of premature labor, decreased fetal movement, bleeding from the birth canal, and abdominal pain if there is trauma to the abdomen/uterus (Fauzi et al., 2016; Leach et al., 2020).

On physical examination, there was a frontal hematoma and multiple vulnus excoriation, obstetric status examination found TFU 3 fingers below the navel, head position, fetal heart rate 152x/minute, no contractions. In TBI patients during pregnancy, primary brain injury can occur in the mother caused by direct injury due to trauma that occurs, or secondary brain injury that occurs due to the ongoing process of primary injury that is not prevented or minimized with appropriate intervention. In the fetus, TBI can cause hypoxia so that there is a decrease in oxygen perfusion to the placenta and fetus, uterine contractions due to direct trauma or increased stress hormones such as cortisol and adrenaline, and bleeding from the birth canal due to detachment of the placenta from the uterine wall or due to direct trauma (Fauzi et al., 2023; Filippo et al., 2022; Leach et al., 2020).

In the supporting examination, a CT scan of the head without contrast was performed, in this patient no bleeding was found. CT scan of the head is a safe, fast, and accurate procedure and is the gold standard for early evaluation of TBI. Ionizing radiation has teratogenic and carcinogenic potential depending on the dose, if it occurs at 5-10 weeks of gestation it can interfere with the organogenesis process and after 10 weeks it can cause delayed growth or injure the central nervous system. CT scan of the head exposes the fetus to the amount of radiation below the threshold of 5,000 mrad, so it is safe for fetal damage (Filippo et al., 2022).

On USG examination, the fetal heart rate was 152x/minute, no contractions, biometry 20/21 weeks, EFW 473 grams, placenta posterior grade II and sufficient amniotic fluid. Determining fetal viability through fetal monitoring is important, the risk of fetal death increases due to trauma to the mother. Assessment of fetal condition that can be done includes fetal heart rate monitoring, serial echography, physical examination and obstetric status. The fetus is considered to be able to survive after 23 weeks of gestation, before that age the chance of survival outside the womb is small, especially after trauma is found (Filippo et al.,2022). In this patient, early assessment and stabilization of the mother through the ATLS protocol is a priority, stabilization of the mother's condition in the early phase can optimize the condition of the fetus because in the first and second trimesters the fetus is considered unable to survive on its own (<23 weeks). The general principle is based on the ABCDE approach (airway, breathing, circulation, disability, exposure). If the mother's condition is critical or there is brain damage that causes maternal brain death, then immediate cesarean section is a priority (Filippo et al., 2022; Haldar et al., 2023).

Secondary brain injury does not occur at the time of trauma, but occurs within hours or days. TBI management including avoiding secondary brain injury with the acronym GHOST-

CAP can help improve the quality of patient care by remembering the main aspects involved in the etiology of secondary brain injury, including glycemia by avoiding hypoglycemia <100 mg/dl, hemoglobin maintained at least in the range of 7-9 g/dl, oxygen saturation maintained 94-97%, sodium maintained within normal limits, temperature avoided hyperthermia conditions >38o C, comfort conditioned the patient in a comfortable state, maintaining arterial pressure (CPP) and PaCO2 within normal limits (Filippo et al., 2022; Haldar et al., 2023). Intracranial hypertension (IHT) in pregnancy reduces cerebral perfusion pressure (CPP) which can cause cerebral ischemia and neurological damage. In addition to preeclampsia, head trauma is one of the most common causes of IHT in pregnancy. Basic interventions such as head elevation, neurological assessment, end-tidal CO2 monitoring can be done first. If there is no improvement, switching to higher management such as administering mannitol, vasopressors, mild hypocapnia, barbiturates, to more aggressive ones such as decompressive craniectomy or using hypothermia can be considered with various considerations of benefits and risks (Filippo et al., 2022; Haldar et al., 2023).

In some cases, preterm delivery can be an option if it can improve the mother's prognosis, after 23 weeks of gestation the fetus is considered viable with glucocorticoids for lung maturation, some studies state that after 32 weeks of gestation there is no need for pregnancy extension. Based on the delivery route, caesarean section is performed in cases of maternal trauma that causes maternal and fetal emergencies according to gestational age, if the mother's condition is stable, vaginal delivery is considered if the fetus is not viable (Filippo et al., 2022; Haldar et al., 2023). In this case, after the management of secondary brain injury has stabilized, the patient was given 30º head elevation, injection of ceftriaxone, ranitidine, ketorolac, piracetam, and ondansetron, given orally multivitamins and minerals, and calcium. The patient was given conservative pregnancy care considering that the fetus was not yet viable (<23 weeks), if inpartum occurred, vaginal delivery was performed, and if fetal distress occurred, the worst possibility could occur until the fetus died.

CONCLUSION

Traumatic brain injury (TBI) in pregnancy requires special considerations because it involves 2 lives, namely the mother and the fetus. Trauma that is considered mild in the general population is not necessarily mild in pregnant women, comprehensive management involving multidisciplinary is needed to get better outcomes.

ACKNOWLEDGEMENTS

The authors would like to thank the supervising doctors, and Dr. Soeroto Regional General Hospital of Ngawi Regency for the publication of this manuscript. The authors also appreciate the Tambusai Health Journal for editing and proofreading.

REFERENCES

Al Fauzi, A., Apriawan, T., Ranuh, I. G. M. A. R., Christi, A. Y., Bajamal, A. H., Turchan, A., Agus Subagio, E., Suroto, N. S., Santoso, B., Dachlan, E. G., Utomo, B., & Kasper, E. M. (2023). Traumatic brain injury in pregnancy: A systematic review of epidemiology, management, and outcome. Journal of Clinical Neuroscience, 107, 106–117. https://doi.org/10.1016/j.jocn.2022.12.007

Cunningham, F. G., Leveno, K. J., Bloom, S. L., Spong, C. Y., Dashe, J. S., Hoffman, B. L., Casey, B. M., & Scorza, W. E. (2022). Williams obstetrics (26th ed.). McGraw-Hill Education.

Di Filippo, S., Godoy, D. A., Manca, M., Paolessi, C., Bilotta, F., Meseguer, A., Severgnini, P., Pelosi, P., Badenes, R., & Robba, C. (2022). Ten rules for the management of moderate and severe traumatic brain injury during pregnancy: An expert viewpoint. Frontiers in Neurology, 13, 911460. https://doi.org/10.3389/fneur.2022.911460

Kho, G. S., & Abdullah, J. M. (2018). Management of severe traumatic brain injury in pregnancy: A body with two lives. Malaysian Journal of Medical Sciences, 25(5), 151–157. https://doi.org/10.21315/mjms2018.25.5.14

Haldar, A., Raj, B., Maurya, V. P., Yunus, M., Mishra, R., & Agrawal, A. (2023). Neurocritical care perspective of traumatic brain injury during pregnancy. Journal of Neurointensive Care, 6(1), 15–19. https://doi.org/10.32587/jnic.2022.00577

Leach, M. R., & Zammit, C. G. (2020). Traumatic brain injury in pregnancy. In Handbook of Clinical Neurology (Vol. 172, pp. 51–61). Elsevier. https://doi.org/10.1016/B978-0-444-64240-0.00003-9

Vaajala, M., Tarkiainen, J., Liukkonen, R., Kuitunen, I., Ponkilainen, V., Kekki, M., & Mattila, V. M. (2023). Traumatic brain injury during pregnancy is associated with increased rate of cesarean section: A nationwide multi-register study in Finland. Journal of Maternal-Fetal & Neonatal Medicine, 36(1), 2203301. https://doi.org/10.1080/14767058.2023.2203301