Chromiec Tomasz, Hetman Marcin, Fornal Natalia, Grzebyk Dominik, Bracik Ewelina, Widłak Karolina, Nurzyńska-Flak Joanna, Prządka Marta. Hepatoblastoma in a one month infant – a case report. Journal of Education, Health and Sport. 2018;8(9):90-95. eISNN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.1327188
http://ojs.ukw.edu.pl/index.php/johs/article/view/5762

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part b item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eissn 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 02.07.2018. Revised: 18.07.2018. Accepted: 03.08.2018.

Hepatoblastoma in a one month infant – a case report

Tomasz Chromiec
Student Scientific Circle at the Department and Clinic of Pediatric Hematooncology, Medical University of Lublin
Poland
Principal contact for editorial correspondence.
Tomasz Chromiec <tomekcrrrr@gmail.com>

Marcin Hetman
Poland

Natalia Fornal
Student Scientific Circle at the Department and Clinic of Pediatric Hematooncology, Medical University of Lublin
Poland

Dominik Grzebyk
Student Scientific Circle at the Department and Clinic of Pediatric Hematooncology, Medical University of Lublin
Poland

Ewelina Bracik
Student Scientific Circle at the Department and Clinic of Pediatric Hematooncology, Medical University of Lublin
Poland

Karolina Widłak
Student Scientific Circle at the Department and Clinic of Pediatric Hematooncology, Medical University of Lublin
Poland

Joanna Nurzyńska-Flak
Department and Clinic of Pediatric Hematooncology, Medical University of Lublin
Poland

Marta Prządka
Student Scientific Circle at the Department and Clinic of Pediatric Hematooncology, Medical University of Lublin
Poland

Abstract:

Introduction:

The manifestations and epidemiology of cancer differ between adults and children. Hepatoblastoma is the most common pediatric liver malignancy with multiple risk factors under investigation or already found to be at play. The aim of this work is to give a quick summary of the epidemiology of pediatric cancer with special consideration given to patients in the neonatal period.

Case report:

A one-month old boy has been admitted to the clinic following an incidental finding of left renal agenesis. Abdomen CT revealed a liver mass that proved to be hepatoblastoma on biopsy. Alpha fetoprotein serum level was found to be elevated. The treatment consisted of right hemihepatectomy and pre- and postoperative, cisplatin-based chemotherapy.

Discussion:

Hepatoblastoma is an age-specific diagnosis with prognosis that improved significantly in recent decades. Liver malignancy should be suspected in children with physical finding of hepatomegaly and always considered in case of elevated alpha fetoprotein or a liver mass on imaging examinations. An extensive list of risk factors that also include genetic syndromes may aid in identifying children that are at a particularly high risk for developing liver malignancy.

Key words: hepatoblastoma, pediatric tumor, renal agenesis

Introduction:

The peak incidence of cancer in children is in the very first year of life. The epidemiology of infant cancer differs from that of childhood cancer taken as a whole. Among malignancies diagnosed in this age group, the most common ones are neuroblastoma, acute lymphocytic leukemia, central

nervous system tumours and retinoblastoma. The incidence is approximately equal in girls and boys, differentiating it from other pediatric age groups, in which cancer occurs more commonly in the latter. [1] Many factors have been invastigated as possibly increasing the risk of childhood cancer. These include: maternal smoking [2,3], low Apgar score [2,4] and birth defects [5]. Infants that have a diagnosis of cancer and are successfully treated are at increased risk for developing chronic medical conditions as a result of the treatment received [6].

Malignancies are uncommon in the neonatal period, accounting for around 2% of cases in children overall [7]. Teratoma and neuroblastoma occur most commonly. Other, less common diagnoses include soft tissue sarcomas, tumours of the kidney, CNS tumours and hematologic malignancies [8,9,10]. There is a well-documented association between neonatal cancer and congenital malformation [11,12].

Hepatoblastoma among children is rare, accounting for less than 1% of malignancies in children under the age of 20 and mainly affects children under the age of 5, with incidence approximately 20 times higher in this group of patients than that of hepatocellular carcinoma, another hepatic malignancy from which it needs differentiation [13]. Risk factors that have been studied include occupational exposures of the parents [14], maternal Asian race [15] younger maternal age [16], labor complications [17]. All this factors have been found to confer some degree of additional risk for developing hepatoblastoma in the respective studies. Smoking has also been suggested to increase hepatoblastoma risk [18,21], with other researchers drawing attention to the possibility of the confounding role of low birth weight [19] for which cigarette smoking is a known factor [20]. Indeed, low birth weight has been extensively studied as a risk factor for hepatoblastoma. The association seems to be strong, with one study putting the relative risk for children with birth weight under 1000g vs >2000 g at 7.70-85.0 (HR=25.6; 95% confidence interval) [22]. Another study identified oxygen therapy and treatment with furosemide as perinatal risk factors predisposing children with very low birth weigh to the development of hepatoblastoma, with the duration of the former found to be most useful in predicting such development [23]. A number of cancer predisposition syndromes are associated with an increased risk of developing hepatoblastoma, most notably familial adenomatous polyposis and a number of overgrowth syndromes [22].

Case report:

A one-month old boy has been admitted to the Department of Pediatric Hematology and Oncology after an ultrasound examination revealed left renal agenesis. Serum AFP levels proved to be elaved and computed tomography scan confirmed the presence of a liver mass. The biopsy was performed and, on the basis of the results, the diagnosis of hepatoblastoma was made. The patient received 4 cycles of preoperative cisplatin-based chemotherapy which was followed by right hemihepatectomy. Subsequently the patient was subjected to 2 cycles of adjuvant, cisplatin-based chemotherapy The patient remains under the care of the Clinic. Since the last visit the parents reported no symptoms apart from occasional constipation. The physical development of the child following the treatment appears to be normal.

Discussion:

Unilateral renal agenesis, which is a relatively frequent congenital malformation, with the estimated incidence of 1 in ~2000, is now thought to necessitate careful investigation, as it is very often associated with other, potentially risk-posing abnormalities, both in the urinary system and outside of it [24]. People born with such an anomaly should be monitored closely in order to prevent the deterioration of renal function, of which the risk has been shown to exist [24,25]. Children with

hepatoblastoma were found to be at fivefold greater risk of having kidney or bladder abnormalities than their healthy counterparts [33]

Most abdominal masses in the neonate are of benign nature, a lot of the time representing, for example, non-malignant retroperitoneal lesions [26]. Every infant presenting with an abdominal mass needs to be subjected to careful physical examination not only confined to the abdomen. Imagining techniques employed in the diagnosis of abdominal masses include simple radiography which may provide significant initial information, showing for example calcifications or organomegaly. An abdominal ultrasound is usually of great clinical utility, as are, in selected cases, computed tomography and magnetic resonance imaging [27].

Differential diagnosis of a hepatic mass in an infant include hemangiomas, mesenchymal hamartomas, hepatoblastoma and metastases to the liver. [28]Hepatic hemangiomas, with the reported incidence as high as 20% according to some authors, are the most common infantile hepatic tumours. Although mostly asymptomatic and typically found only incidentally, at times they require intervention. On ultrasound, hepatic hemangiomas present as hyperechoic, clearly demarcated nodular masses that, importantly, typically don't change in size on follow-up examinations, which is a useful sing of a bening character of the tumour [29] An ultrasound of a mesenchymal hamartomas typically shows an anechoic mass that posseses internal septations [28]. Both neoplasms can present with an elavated level of AFP, not derived from the tumour itself in case of hemangioma [30] and, in case of mesenchymal hamartomas produced by hepatocytes within hamartoma that result from either entrapment of surrouding liver tissue or, alternatively, are original components of the tumour [31]. It is a very important serum marker giving clinicists valuable information about a patient’s response to treatment. Its levels has been also proven to inversely correlate with hepatoblastoma variants of less favourable prognosis.[32]

On ultrasound hepatoblastoma usually shows as large hepatic mass, sometimes with foci of hemorrhage within the mass. Satellite lesions may also be present. Multiphase CT and MRI are useful diagnostic tools and hypervascular lesion with a delay in contrast excretion characteristic of malignant hepatic tumours. Histological confirmation of hepatoblastoma is a key diagnostic step, with some authors suggesting to abstain from perfmorming it in children older than 6 months and younger than 3 years that have very high levels of AFP [32]

SIOPEL classifies hepatoblastoma cases into three risk groups. Standard risk group encompasses cases of localized disease with no adverse characteristics. The assignement of very high risk group is given to patients with metastases or AFP serum levels that are very low and the intermediate high risk group is given to patients with unresectable tumours but without distant metastases or with what is called 'combi factors'. Resection or liver transplant are recommended for patients in standard risk patients, with SIOPEL recommending cisplatin-based preoperative chemotherapy for all patients and additional postoperative chemotherapy in the majority of case, which constitutes the treatment the patient received. [32]

References

[1]Ries LAG, Smith MA, Gurney JG, Linet M, Tamra T, Young JL, Bunin GR (eds). Cancer Incidence and Survival among Children and Adolescents: United States SEER Program 1975-1995, National Cancer Institute, SEER Program. NIH Pub. No. 99-4649. Bethesda, MD, 1999

[2]Bhattacharya S, Beasley M, Pang D, et al. Maternal and perinatal risk factors for childhood cancer: record linkage study. BMJ Open 2014;4:e003656.

[3]Annie J Sasco and Harri Vainio. From in utero and childhood exposure to parental smoking to childhood cancer: a possible link and the need for action. Hum Exp Toxicol. 1999 Apr;18(4):192-201. Review.

[4]Li J, Cnattingus S, Gissler M, et al. The 5-minute Apgar score as a predictor of childhood cancer: a population-based cohort study in five million children. *BMJ Open*. 2012;2(4):e001095.

[5]Johnson KJ, Lee JM, Ahsan K, et al. Pediatric cancer risk in association with birth defects: A systematic review. Chang JS, ed. *PLoS ONE*. 2017;12(7):e0181246.

[6]Aung L, Khyne T, Yeoh AE, Quah TC, Tan AM. Long-Term Outcomes after Cancer in Infancy: A Report from the Childhood Cancer Survivor Study (CCSS). Ann Acad Med Singapore. 2009 Aug;38(8):684-9.
[7]Moore SW, Satgé D, Sasco AJ, Zimmermann A, Plaschkes J. The epidemiology of neonatal tumours. Report of an international working group. Pediatr Surg Int 2003; 19: 509–519.
[8]Barson AJ. Congenital neoplasia: the society's experience. Arch Dis Child. 1978;53:436.

[9]Parkes, S.E., Muir, K.R., Southern, L., Cameron, A.H., Darbyshire, P.J., Stevens, M.C.G. Neonatal Tumors (A Thirty-Year Population-Based Study) . Medical and Pediatric Oncology. 1994;22:309–317.
[10]Halperin EC. Neonatal neoplasms. Int J Radiat Oncol Biol Phys. 2000;47:171–8.

[11]Altmann AE, Halliday JL, Giles GG. Associations between congenital malformations and childhood cancer. A register-based case-control study. *British Journal of Cancer*. 1998;78(9):1244-1249.

[12]Tornero OB, García JAO, Tortajada JF i, et al. Tumores neonatales y malformaciones congénitas. *Anales de pediatria (Barcelona, Spain : 2003)*. 2008;68(6):589-595.

[13]Darbari A, Sabin KM, Shapiro CN, Schwartz KB. Epidemiology of primary hepatic malignancies in US children. Hepatology 2003; 38: 560–566.

[14]Janitz AE, Ramachandran G, Tomlinson GE, Krailo M, Richardson M, Spector L. Maternal and paternal occupational exposures and hepatoblastoma: results from the HOPE study through the Children's Oncology Group (COG). *Journal of exposure science & environmental epidemiology*. 2017;27(4):359-364.

[15]Spector LG, Johnson KJ, Soler JT, Puumala SE. Perinatal risk factors for hepatoblastoma. *British Journal of Cancer*. 2008;98(9):1570-1573.

[16]McLaughlin CC, Baptiste MS, Schymura MJ, Nasca PC, Zdeb MS. Maternal and infant birth characteristics and hepatoblastoma. Am. J. Epidemiol. 2006;163:818–828.

[17] Heck JE, Meyers TJ, Lombardi C, et al. Case-control study of birth characteristics and the risk of hepatoblastoma. *Cancer epidemiology*. 2013;37(4):390-395.

[18]Sorahan T, Lancashire RJ. Parental cigarette smoking and childhood risks of hepatoblastoma: OSCC data. *British Journal of Cancer*. 2004;90(5):1016-1018.

[19]Spector LG, Ross JA. Smoking and hepatoblastoma: confounding by birth weight? *British Journal of Cancer*. 2003;89(3):602.

[20]Ko TJ, Tsai LY, Chu LC, Yeh SJ, Leung C, Chen CY, Chou HC, Tsao PN, Chen PC, Hsieh WS. Parental Smoking During Pregnancy and Its Association with Low Birth Weight, Small for Gestational Age, and Preterm Birth Offspring: A Birth Cohort Study. Pediatr Neonatol. 2014 Feb;55(1):20-7. Epub 2013 Jul 12.

[21]Johnson KJ, Williams KS, Ross JA, et al. Parental tobacco and alcohol use and risk of hepatoblastoma in offspring: A report from the Children's Oncology Group. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology*. 2013;22(10):1837-1843.

[22]Spector LG, Johnson KJ, Soler JT, Puumala SE. Perinatal risk factors for hepatoblastoma. *British Journal of Cancer*. 2008;98(9):1570-1573.

[23] Maruyama K, Ikeda H, Koizumi T, Tsuchida Y, Tanimura M, Nishida H, Takahashi N, Fujimura M, Tokunaga Y. Case-control study of perinatal factors and hepatoblastoma in children with an extremely low birthweight.Pediatr Int. 2000 Oct;42(5):492-8.

[24]Westland R, Schreuder MF, Ket JC, van Wijk JA. Unilateral renal agenesis: a systematic review on associated anomalies and renal injury. Nephrol Dial Transplant. 2013 Jul;28(7):1844-55. Epub 2013 Feb 28. Review.

[25]Doğan ÇS, Torun Bayram M. Renal outcome of children with unilateral renal agenesis.Turk J Pediatr. 2013 Nov-Dec;55(6):612-5.

[26]Hartman GE, Shochat SJ. Abdominal mass lesions in the newborn: diagnosis and treatment.Clin Perinatol. 1989 Mar;16(1):123-35. Review.

[27]Chandler JC, Gauderer MW. The neonate with an abdominal mass. Pediatr Clin North Am. 2004 Aug;51(4):979-97, ix. Review.

[28]Alamo L, Beck-Popovic M, Gudinchet F, Meuli R. Congenital tumors: imaging when life just begins. *Insights into Imaging*. 2011;2(3):297-308.

[29]Bajenaru N, Balaban V, Săvulescu F, Campeanu I, Patrascu T. Hepatic hemangioma -review- . *Journal of Medicine and Life*. 2015;8(Spec Issue):4-11.

[30]Itinteang T, Chibnall AM, Marsh R, et al. Elevated Serum Levels of Alpha-Fetoprotein in Patients with Infantile Hemangioma Are Not Derived from within the Tumor. *Frontiers in Surgery*. 2016;3:5.

[31]Chang HJ, Jin SY, Park C, et al. Mesenchymal Hamartomas of the Liver: Comparison of Clinicopathologic Features between Cystic and Solid Forms. *Journal of Korean Medical Science*. 2006;21(1):63-68.

[32]Hiyama E. Pediatric hepatoblastoma: diagnosis and treatment. *Translational Pediatrics*. 2014;3(4):293-299.

[33]Spector LG, Puumala SE, Tomlinson GE, et al. Abstract 3774: Congenital abnormalities and hepatoblastoma: A report from the Children's Oncology Group (COG). Cancer Res 2011;70:3774–3774