

Review of gastric adenocarcinoma in children

Abstract

Gastric tumors in children are very rare with non-specific symptoms. There are not many reported cases in the world; however it is important to know the epidemiology, the global distribution, etiology, symptoms and their possible treatment.

Keywords: gastric adenocarcinoma, pediatric cancer, cagA, vacA, HER2, helicobacter pylori

Volume I Issue 3 - 2018

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Received: June 05, 2018 | **Published:** June 20, 2018

Introduction

Gastric tumors in children are uncommon and represent 0.05% of all gastrointestinal neoplasms.¹ In the world, the gastric adenocarcinoma has an incidence of one million cases per year,² in Latin America, East Asia, some parts of Europe and the Middle East, is the second cause of death by cancer.³ Common symptoms of patients with gastric adenocarcinoma include epigastric pain, nausea, vomiting, weight loss, hyporexia and feeling of fullness.⁴ The risk factors and etiology in adults are well known, including lifestyle factors or infectious factors, but in children is still unknown,⁵ being able to be multifactorial.⁶

Etiology

The gastric adenocarcinoma is related with co-infection with *H. Pylori*, which is mainly acquired during childhood and remains for life if not treated with antibiotics. This bacterium has a pro-carcinogenic function due to its virulence factors *cagA* and *vacA*. The gene *cagA* encode the oncogenic protein with its same name that starts a chain of molecular events linked with carcinogenesis. The gene *vacA* leads to apoptosis by inducing pores in the cell membrane. *H. pylori*-induced inflammation leads to a microenvironment that is high in oxygen and nitrogen leading to hypermethylation of DNA, silencing genes associated with tumor suppression.⁶⁻⁸ *H. pylori* also stimulates activation-induced cytidine deaminase altering nucleotides, leads to break the double-stranded DNA.⁸

The human epidermal growth factor receptor 2 (HER2) is seen in gastric adenocarcinoma. The gene for the receptor is a proto-oncogene located in the chromosome 17q21 that encodes a tyrosine kinase receptor protein, member of the HER family: HER1, HER2, HER3 and HER4. Yamamoto and colleagues first described overexpression of HER2 in gastric cancer in 1986, and since then many studies confirmed these results, however the prevalence of HER2 overexpression varies from study to study.^{9,10} Also, the epigenetic is involved in the incidence of gastric adenocarcinoma. A study made by Shin CM and colleagues from 2003 to 2008 with 935 patients, after adjusting for environmental factors and *H. pylori* infection; conclude that family history of gastric cancer in first-degree relatives was independently associated with the risk for gastric cancer.¹¹

Diagnosis

Endoscopic ultrasonography is a combined technique of high-frequency ultrasound and endoscopy that improved the preoperative

diagnosis and staging of gastric cancer. Also allows the evaluation and biopsy of submucosal lesions to classify early stages of the disease, being the most reliable nonsurgical method available to predict the depth of gastric cancer.^{12,13} It has been in use since 1980s and its accuracy varies between 65 and 92.1%. The sensitivity and specificity for assessing serosal involvement varies between 77.8% and 100% and between 67.9% and 100%, respectively. Multidetector computed tomography is considered the best technique, being non-invasive, to identify extension of tumor, nodal disease and metastases.¹³ The clinical staging also can be done by laparoscopy, improving the noninvasive imaging that can't identify tumor deposits on peritoneal surfaces,¹⁴ but this is not performed routinely because of its costs and risks involved in surgery.

Treatment

H. pylori eradication therapy consists in administration of antibiotics. It must be considered the acceptability, cost, known or suspected patterns of resistance in the population to treat.⁸ The mainly criteria to assess children with *H. pylori* infection are gastrointestinal and extra gastrointestinal manifestation related to *H. pylori* infection and parasite co-infection; familial history of gastric cancer, peptic ulcer and lymphoma MALT; symptomatic children living in high prevalence region and immigrant or adopted children in developed countries.⁷ The only potentially curative treatment for localized gastric cancer is complete surgical resection.¹⁵ It also provides the most effective palliation of symptoms, especially those with an obstructive pattern. However, when there is extensive involvement (Bormann IV), metastatic disease, retroperitoneal invasion or peritoneal carcinomatosis, this type of surgery does not seem to be relevant.¹⁶ Some trials suggest administration of postoperative chemotherapy, improving the survival in patients.¹⁵

Conclusion

Gastric adenocarcinoma is rare in children and the symptoms are not specific; however, it must be considered as a differential diagnosis.

Acknowledgements

None.

Conflict of interests

The author declares there is no conflict of interest.

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