

## ORIGINAL ARTICLE

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# Revisiting post-gastrectomy anemia with a brief survey among a group of Turkish medical oncologists

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## Summary

**Purpose:** Total or subtotal gastrectomy are performed as curative or palliative treatment in patients with gastric cancer. Anemia is a frequent complication of gastrectomy. Patients undergoing total or subtotal gastrectomy should be carefully monitored for the development of anemia and be given appropriate treatment when indicated. This survey-based study aimed to determine the level of knowledge about post-gastrectomy anemia in Turkish medical oncologists.

**Methods:** The study included 110 Turkish medical oncologists that agreed voluntarily to participate in the survey and answer an 8-item questionnaire. The survey was distributed as a questionnaire during the 5<sup>th</sup> Turkish Medical

Oncology Congress in March 2014.

**Results:** All participants completed the questionnaire. Most of the participants would not recommend oral iron or cobalamin replacement after gastrectomy.

**Conclusion:** The results of the survey indicate that Turkish medical oncologists have some knowledge about post-gastrectomy anemia, but need to learn more about appropriate follow-up and replacement therapies for post-gastrectomy anemia.

**Key words:** anemia, gastrectomy, medical oncologist, survey

## Introduction

Gastric cancer is one of the most lethal cancers worldwide [1]. Total or subtotal gastrectomy are performed as palliative or curative treatment of gastric cancer. Gastrectomy is associated with serious long term metabolic complications, some of which are due to malabsorption of essential micronutrients, like iron, vitamin B12 (cobalamin/Cbl), folic acid, copper, zinc and calcium [2]. Gastric cancer survivors are usually followed by medical oncologists. Some of these patients develop iron deficiency anemia or megaloblastic anemia due to Cbl deficiency after gastrectomy [2-4]. In addition, some patients already have iron deficiency anemia due to chronic blood loss or Cbl deficiency related to atrophic gastritis prior to gastrectomy. So, all the patients with gastrectomy should be followed regularly to prevent anemia

and its complications [4,5]. Routine replacement with iron and Cbl after gastrectomy is recommended by some researchers [6].

The present study aimed to determine the awareness and level of knowledge about post-gastrectomy anemia in a group of Turkish medical oncologists.

## Methods

This study used a questionnaire to determine the awareness, treatment approach and level of knowledge of Turkish medical oncologists about anemia developing due to post-gastrectomy micronutrient deficiency. The questionnaire was distributed during the 5<sup>th</sup> Turkish Medical Oncology Congress in March 2014 in Antalya with medical oncologists who agreed to participate in the study. Among the 8 questionnaire items, 7

questions had 3 response options and 1 question (item 7) had 4 response options. The participants could select only 1 response option per item. The questionnaire is shown in the Appendix.

## Results

A total of 110 medical oncologists participated in the study and fully completed the questionnaire.

Item 1 questioned whether the development of Cbl deficiency differed in total and subtotal gastrectomy. The question stated that "Cbl deficiency develops after total gastrectomy but not after subtotal gastrectomy". Seventy three participants (67%) agreed that Cbl deficiency may develop after total gastrectomy but not after subtotal gastrectomy, whereas 33 participants (30%) disagreed and 4 participants (3%) had no idea.

Item 2 was dealing about the correct route of replacement for Cbl in patients after surgery for gastric cancer. Fifteen of the participants (14%) agreed that Cbl may be replaced orally as well as intramuscularly, whereas 93 (84.5%) disagreed and 2 (1.5%) had no idea.

Item 3 questioned the etiology of post-gastrectomy anemia. Fifty one participants (46%) agreed that iron deficiency anemia is more frequent than Cbl deficiency, whereas 41 (37%) disagreed and 18 participants (17%) had no idea.

Item 4 asked about the necessity of routine replacement of Cbl and iron after total gastrectomy. Fifty six participants (51%) agreed that these 2 micronutrients should routinely be replaced after gastrectomy, whereas 52 (47.5%) disagreed and 2 (1.5%) had no idea.

Item 5 searched the adequacy of the dose of Cbl in vials. Fifty participants (45%) agreed that Cbl vials contain a dose that is 10 times higher than the monthly requirement, whereas 12 (11%) disagreed and 48 participants (44%) had no idea.

Item 6 questioned the antioxidant effect of Cbl. Thirty four participants (31%) agreed that Cbl has an antioxidant effect, whereas 32 participants (29%) disagreed and 44 participants (40%) had no idea.

Item 7 asked about the micronutrient deficiency that causes a hematologic and /or neurological syndrome mimicking Cbl deficiency. Eleven (10%) participants selected copper, 30 (27%) selected selenium and 17 (14.5%) selected zinc. Fifty two participants (47.5%) had no idea.

Item 8 questioned the correct route of iron replacement after gastrectomy. Fifty two participants (47.5%) agreed that iron can be replaced

orally as well as parenterally, whereas 52 (47.5%) disagreed and 6 (5%) had no idea.

## Discussion

Anemia is a common complication following both total and subtotal gastrectomy [2-6]. Lim et al. conducted a trial in which patients treated with total or subtotal gastrectomy for gastric cancer were followed for more than 4 years for the development of anemia [3]. They reported that up to 44% of the patients had iron deficiency after 4 years. In this trial, low serum Cbl levels were detected in up to 70% of the patients, although megaloblastic anemia was rare. The researchers recommended regular follow up and appropriate replacement in patients that undergo gastrectomy for gastric cancer. Beyan et al. studied the etiology of anemia in 72 patients that underwent gastrectomy [5]. The most common type of anemia was due to combined iron and Cbl deficiencies. In addition, 94% of the patients had iron deficiency and 79% had vitamin B12 deficiency.

The most common causes of anemia after gastrectomy are iron deficiency or Cbl deficiency, either alone or in combination [5,7]. The prevalence of iron deficiency following gastrectomy is reported to be higher than that of Cbl deficiency. Hines et al. reported 292 patients with benign ulcer with partial gastrectomy. Iron deficiency anemia was noted in 52 patients, 12 had isolated Cbl deficiency anemia and 84 had combined Cbl/folate and iron deficiency [7].

Iron deficiency may be due to absence of acid secretion or duodenal by-pass [8]. Patients with gastric cancer may also have iron deficiency due to preoperative chronic blood loss or intra- and postoperative blood loss [5,8]. Iron deficiency anemia can develop in the first few years after gastrectomy in the absence of appropriate replacement.

The incidence of Cbl deficiency after gastrectomy depends on the extent of surgery. In a retrospective review of 645 patients with gastric cancer, Cbl deficiency rate was 100% for total gastrectomy and 16% for subtotal gastrectomy 4 years after surgery [9]. Cbl deficiency after gastrectomy usually develops due to the absence of the intrinsic factor, which is required for absorption of the vitamin via intestine. Patients with gastric cancer may also have low Cbl levels in the preoperative period [5,9]. As the body's store of Cbl may last for 1-2 years (sometimes even up to 4-5 years), Cbl deficiency develops several years after gastrectomy. Cbl deficiency causes not only

various cytopenias, but also a unique neurologic syndrome known as subacute combined degeneration [10]. Neurologic dysfunction due to Cbl deficiency may be irreversible if replacement is not initiated in a timely fashion. As Cbl has no known significant side effects, physicians are rarely concerned about the dose of Cbl in vials that is 10 times higher than the required monthly dose. Although both iron and Cbl (at least in a substantial fraction of patients) can be successfully replaced orally after gastrectomy, parenteral replacement especially of cobalamin is not an uncommon practice [11-14].

In rare cases copper deficiency can develop years after gastrectomy [15]. Hypocupremia can cause hematologic and neurologic symptoms that resemble those of cobalamin deficiency [16,17].

Among the present study's noteworthy findings is that nearly half of the participants did not agree with the concept of routine Cbl and iron replacement after total or subtotal gastrectomy. We do not know if they follow-up iron or Cbl levels in these patients. According to the literature, there is no consensus concerning routine iron and Cbl replacement following total gastrectomy.

The second important point about replacement of Cbl and iron after total gastrectomy is the ideal route of administration. Several studies reported that Cbl can be safely and effectively replaced via oral route which is more convenient for patients who have coagulopathy or do not want to experience monthly painful injections [11,14,18]. Iron absorption may be impaired after total or subtotal gastrectomy [4,7]. The type of surgical procedure (e.g. gastroduodenostomy vs gastrojejunostomy), a decrease in the consumption of red meat due to changes in dietary habits (i.e. heme-iron), lack of gastric acid or an increase in transit time can affect the absorption of iron [5,9,17,18]. Nonetheless, sufficient iron absorption does occur in substantial fraction of the patients [8,9]. In particular, patients with subtotal gastrectomy may benefit from oral replacement of iron. As parenteral iron replacement is associated with significant cost and side effects (e.g. allergic reaction), the oral route may be appropriate for some of the patients [19,20]. In case of failure or intolerance of oral treatment, parenteral replacement might be a viable alternative [20]. Probable reasons for oral treatment failure, such as ongoing blood loss, should also be considered.

The third significant point is that deficiency of micronutrients other than iron and cobalamin may develop in patients who underwent gastrec-

tomy (e.g. folate, zinc, copper, calcium, vitamin D), each of which can cause varying symptoms. As such, when evaluating these patients with unexplained signs and symptoms, clinicians should always consider all potential nutrient deficiencies [21,22].

In conclusion, we believe that all medical oncologists should be well informed about post-gastrectomy anemia. We claim that patients should be followed regularly for the development of anemia. The cause of anemia should be identified and treated appropriately so as to prevent the hematologic and neurological complications.

## Appendix

### *Study questionnaire*

1. Vitamin B12 deficiency develops after total gastrectomy but not after subtotal gastrectomy
  - a. I agree
  - b. I disagree
  - c. I have no idea
2. In patients that undergo gastrectomy, cobalamin replacement cannot be administered orally; it must be replaced parenterally
  - a. I agree
  - b. I disagree
  - c. I have no idea
3. Iron deficiency is more common than cobalamin deficiency after gastrectomy
  - a. I agree
  - b. I disagree
  - c. I have no idea
4. Iron and cobalamin replacement should not be done routinely after total gastrectomy. The replacement therapy should be tailored individually according to follow-up findings.
  - a. I agree
  - b. I disagree
  - c. I have no idea
5. Vials of vitamin B12 contain ten times higher than the monthly required dose
  - a. I agree
  - b. I disagree
  - c. I have no idea

*Continued on next page*

6. Vitamin B12 does not have any anti-oxidant effects
  - a. I agree
  - b. I disagree
  - c. I have no idea
7. Deficiency of which micronutrient may cause hematologic and neurologic signs and symptoms and laboratory findings resembling vitamin B12 deficiency?
  - a. Selenium
  - b. Zinc
  - c. Copper
  - d. I have no idea
8. In patients that undergo gastrectomy, iron replacement cannot be administered orally, it should be administered parenterally
  - a. I agree
  - b. I disagree
  - c. I have no idea

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