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Effect of Splenectomy in thalassemia major patients on some blood parameters, hormones & Blood transfusion frequency

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Abstract

To assess the benefit of the elective splenectomy in particular patients cases with thalassemia major. This is a cross sectional study, carried out in Azadi teaching hospital Kirkuk, Iraq, from the period of Jan. 2013 to April 2014. Out of 60 patients 33 (55%) were male and 27(45%) were female, age ranges from 10-20 years with a mean age of 15 years. Out of 60 patients, 37 were splenectomized and 23 were non splenectomized. There was no significant difference in regard of Hb, PCV, serum ferritin, FSH, LH and GH in both sexes between splenectomized and non splenectomized patients, but we found a significant difference only in female FSH conc. between splenectomized and non splenectomized female. in splenectomised patients, blood transfusions decreased significantly, furthermore, most patients receive the lowest number of blood transfusions. In selected thalassemia major patients, we conclude that splenectomy is a safe and helpful surgery.

Keywords: TM splenectomized patients, Blood parameters, Hormones and blood transfusion

تأثير عملية رفع الطحال لدى مرضى الكبرى على بعض معلمات الدم , الهورمونات و عدد مرات نقل الدم

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الخلاصة

لتقييم فائدة استئصال الطحال الاختياري في حالات خاصة لمرضى الثلاسيميا الكبرى. هذه دراسة مقطعية أجريت في مستشفى آزادي التعليمي في كركوك ، العراق ، في الفترة من كانون الثاني (يناير) 2013 إلى نيسان (أبريل) 2014. من بين 60 مريضاً ، كان 33 (55٪) من الذكور و 27 (45٪) من الإناث ، وتتراوح أعمارهم من 10 إلى 20 عامًا بمتوسط عمر 15 عامًا. من بين 60 مريضا ، تم استئصال 37 مريضا و 23 لم يتم استئصال الطحال. لم يكن هناك فرق معنوي في الهيموغلوبين ، حجم خلايا الدم المضغوط، فيريتين المصل ، الهرمون المحفز للجريبات، الهرمون المطلق و هرمون النمو في كلا الجنسين بين مرضى استئصال الطحال وغير المستأصلين ، لكننا وجدنا فرقاً معنوياً فقط في تركيز الهرمون المحفز للجريبات للإناث بين الأنثى المستأصلة للطحال وغير المستأصلة الطحال. كذلك لوحظ انه في مرضى استئصال الطحال ، انخفضت الحاجة الى نقل الدم بشكل ملحوظ ، علاوة على ذلك ، يتلقى معظم المرضى المستاصلين للطحال أقل عدد من عمليات نقل الدم في مرضى الثلاسيميا الرئيسيين المختارين ، نستنتج أن استئصال الطحال عملية آمنة ومفيدة.

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1. Introduction

Thalassemia is a group of disorders of the red blood cell (RBC) protein, hemoglobin, which is the primary carrier of oxygen in the blood. β-Thalassemia It is one of the most common disorders in Mediterranean countries, and it is caused by mutations in the gene that produces the -globin chain on chromosome 11. [(1)] Worldwide, β-thalassemia is believed to affect about one in 100 000 live births. [(2)]

The treatment of thalassemia major has traditionally included transfusion of RBCs, iron chelation, and splenectomy. The need for splenectomy in thalassemia major is more likely where the disease is not suppressed efficiently by transfusion treatment. Yet, even after decades of experience, important questions on splenectomy for thalassemia major remain unresolved, such as long-term hematological and immunological response. The aim of this study was to evaluate the long-term outcomes of splenectomy for the treatment of β-thalassemia major.

Splenectomy is required in the majority of people with homozygous beta-thalassemia at some point. The spleen used to become substantially enlarged in early infancy before the introduction of hyper transfusion, and splenectomy was required to ease the mechanical stress caused by its large size. When a splenectomy was performed before the age of six, the risk of severe post-splenectomy infection (PSI) was considerable (10-20%), with a high rate of morbidity and mortality. [(3)] Massive splenomegaly is uncommon when hyper transfusion is used. Evidence of greater destruction of transfused RBCs, as evidenced by an increased transfusion demand, is the most common reason for splenectomy today. Hypersplenism is indicated by amounts greater than 200 ml/kg/year, which is a reason to seek splenectomy. In virtually all cases, splenectomy can be postponed until after the child reaches the age of six, when the danger of PSI is considerably reduced. [(4)] Transfusion requirements are significantly reduced after Splenectomy. Immunization with pneumococcal and H. influenza Polysaccharide vaccines should be administered prior to elective splenectomy. Prophylactic antibiotics are frequently recommended for patients with asplenia because they have a higher risk of serious bacterial infections (PSI). [(5)]

If surgery is necessary, a partial or complete splenectomy is an option. A partial splenectomy is a difficult procedure that preserves some splenic function. It should only be used in newborns who require a splenectomy. Laparoscopic surgery is frequently used to do a full splenectomy. In situations of severe splenomegaly, however, an open operation is required. [(6)]

2. Material and Methods

A study design was cross section, carried out in Azadi Teaching Hospital thalassemia center in Kirkuk city during a period of January 2014 until April 2014. 96 participants in this study, the β- thalassemia number patients was 60(27 were females and 33 male patients), their age range from 10-20 years.

Parents ounseling was done bre surgery regard after splenectomy sepsis then informed consent obtained. The life quality was assessed with a questionnaire pre and 6 months post-surgery. Throughout 60 patients, 37 patients with Thalassemia Major had operated open splenectomy. The age range of patients was 5 years - 10 years(21 male & 16 female) children. The main frequent indications for splenectomy was a massive splenomegaly, also neutropenia & frequent transfusions of blood monthly. Excluded patients: minor and intermedia thalassemia , sickle cell and other people with blood problems who took part in this research, Pre-operatively, the patient's hemoglobin was kept between 8 and 10 gm/dl,

and two weeks before to surgery, the patient's hemoglobin was kept between 8 and 10 gm/dl., vaccination for patients against pneumococcus , meningococcus as well as H. Influenza had been done. Complications after operation and life quality were evaluated.

Sepsis post Splenectomy possibility, and visits for hemoglobin check up follow up were clarified for parents.

3. Results

Patients distribution according to the gender and Splenectomy was: 37 patients (21 were male & 16 were female) had removal of the spleen out of total 60 thalassemic patients, table 1:

Table 1 : patients distribution and Splenectomy

Gender	Positive		negative		Total
	number	%	number	%	
Male	21	63.64 %	12	36.36 %	33
Female	16	59.25 %	11	40.75 %	27
Total	37	61.66%	23	38.34%	60

For hematological parameters,: hemoglobin Hb , packed cell volum PCV and serum ferritin SF; there was no significant difference between splenectomised and non-splenectomised male patients thalassemia, table 2:

Table 2: Hematological parameters comparison of male patients

Parameters	Splenectomised (n=21)	Non-splenectomised (n=12)	P-value
Hb (g/dl)	7.90 ± 1.09	8.092 ± 0.334	NS
PCV(L/L)	24.59 ± 3.19	25.28 ± 1.00	NS
Ferritin(ng/ml)	4668 ± 2924	4219 ± 2783	NS

Also this study didn't found a significant difference between splenectomised & non-splenectomised male patients , Regarding serum hormones (FSH, LH, TSH & GH)

Table 3:

Table 3: Hormones comparison of male patients

Parameters	Splenectomised (n=21)	Non-splenectomised (n=12)	P-value
FSH (mIU /ml)	13.7 ± 6.7	8.5 ± 2.5	NS
LH (mIU /ml)	2.45 ± 1.74	1.27 ± 0.24	NS
TSH (mIU /ml)	5.23 ± 3.07	7.16 ± 4.14	Ns
GH (µIU/ml)	3.26 ± 2.18	3.25 ± 1.69	NS

As well as, for female results, in regard of hematological parameters of female; we didn't found any significant differences between splenectomized and non splenectomized female patients, table 4:

Table 4: Hematological parameters comparison of female patients

parameter	Splenectomised (n=16) (Mean±SD)	Non-splenectomised (n=11) (Mean±SD)	P-value
Hb (g/dl)	8.06±1.22	7.773±0.989	Ns
PCV(L/L)	25.17 ± 3.66	24.32 ± 2.97	Ns
Ferritin(ng/ml)	4137 ± 2482	4741 ± 2676	NS

Furthermore, in regard hormones , this study didn't found significant difference between splenectomized and non splenectomized female patients in regard of FSH, LH and GH but a significant difference was found only in regard of TSH, table 5:

Table 5: Hormones comparison of female patients

Parameters	Splenectomised (n=16)	Non-splenectomised (n=11)	P-value
FSH (mIU /ml)	3.04 ± 2.00	7.94 ± 2.80	NS
LH (mIU /ml)	2.69 ± 1.69	2.71 ± 1.28	NS
TSH (mIU /ml)	4.84 ± 2.83	6.46 ± 2.85	0.05*
GH (µIU/ml)	5.98 ± 2.34	3.49 ± 1.98	NS

This study showed the correlation of serum ferritin concentration and times of blood transfusion: regarding non splenectomized patients, whenever serum ferritin conc. Increases, transfusion times increases, figure 1:

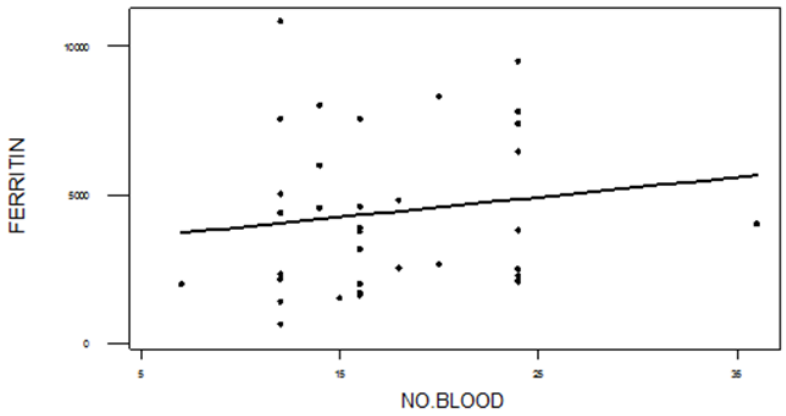

Figure 1: shows correlation of serum ferritin and times of blood transfusion in non splenectomized patients

While in splenectomized patients, our study clarified a significant decrease of blood transfusion times, figure 2:

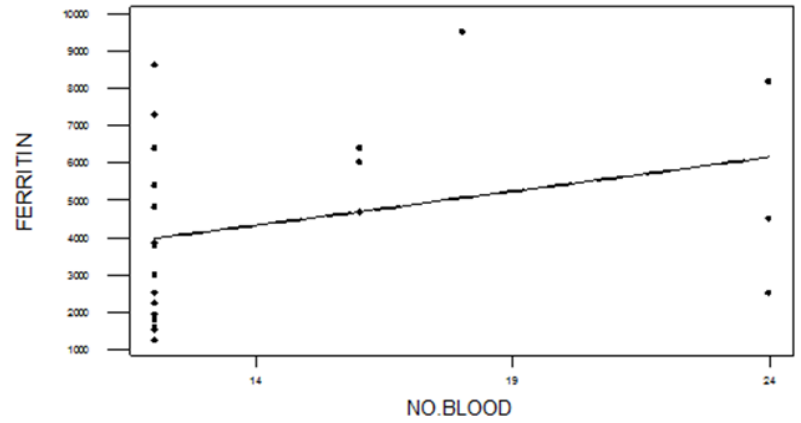

Figure 2: shows a correlation between serum ferritin and times of blood transfusion in splenectomized patients

4. Discussion

The splenomegaly concerned as a logical outcome in major beta thalassemia patients leading to excessive abnormal RBCs destruction & excess iron overload which deposition in all of liver and heart. [7] Splenomegaly furthermore increases blood transfusion necessity so thus patients were benefited of splenectomy.[8,9]

From 60 patients, 37 (21 male and 16 female) had spleen removal operation that represents 61.66% that form a great percentage.

A study recorded an increases in hemoglobin concentration [10] after Splenectomy disagreeing with our results that showed an insignificant alteration ($p \geq 5$) in regard Hb conc. between splenectomized and non splenectomized patients.

Numerous studies results agreed our results that have proved a reduction in the blood transfusion requirements nearly after splenectomy operation.[11,12]

Increased iron deposition in the pituitary gland causes cytotoxicity in transfusion-dependent thalassemia major, resulting in hypogonadotropic hypogonadism. For successful treatment, early diagnosis and quantification of iron in the pituitary gland are critical. Thalassemia causes hypophyseal injury due to fluctuating pituitary iron excess. With early and comprehensive chelation therapy, this endocrine disruption is becoming less common. [13] The prevalence of various endocrine problems varies by center, especially in the cases of GH insufficiency, hypoparathyroidism, and hypothyroidism. [14]

In fact although we didn't inferred any study about hormones influencing between splenectimized and non splenectomized patients, the present study didn't find any signinficant difference($p > 0.5$) between splenectomized and non splenectomized patients in regard FSH, LH and GH , but a clear significant alteration in regard TSH hormone($p < 0.05$).

5. Conclusions

In thalassemia patients, splenectomy has both advantages and disadvantages. The primary goal is to improve the patient's quality of life, which is linked to the need for blood transfusions and the issues that come with them. The splenectomy resulted in a lower frequency of blood transfusions and a better overall blood profile

Refereces

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