Anterior ischemic optic neuropathy complicating redo coronary artery bypass grafting

Redo koroner arter baypas cerrahisi sonrası gelişen anterior iskemik optik nöropati

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Abstract

Anterior ischemic optic neuropathy (AION) is a rare cause of visual loss in patients who have undergone nonoptical surgery. The incidence of AION, in cardiac surgery differs between 0.06% and 1.3%. AION following cardiac surgery is a multifactorial disease. The etiology includes prolonged cardiopulmonary bypass (CPB) time and myocardial ischemia, the risk for micro-embolization during aortic cannulation and clamping, the CPB-related inflammatory response, excessive haemodilution, hypo- or hypertension, systemic hypothermia, and the perioperative irregular blood sugar values. A 50-year-old man, with a history of diabetes mellitus (DM), hypertension, coronary artery bypass grafting surgery (CABG) in 1999, underwent a redo CABG in our department. On the first postoperative day, the patient complained of a sudden, painless, almost total loss of vision of his right eye. In the neurological examination, almost total loss of vision in the lower-half of the visual field of right eye was observed, and no other neurological finding was observed. The preoperative haemoglobin (Hgb) was 12.8 g/dL with a haematocrit (Htc) of 40.0%; and the erythrocyte sedimentation rate (ESR) was 40 mm/h. The patient's Htc levels were kept 19.1-21.6% during the operation. The preoperative Haemoglobin A1c was 6.6%. The CPB time was prolonged due to the multiple coronary artery revascularization. AION is an important cause of visual loss and any recovery of vision is unusual and no treatment has been shown to aid recovery. It usually affects patients over the age of 50 years. In this case, we believe that the main etiological factors in the occurence of AION were low Hgb and Htc levels, the prolonged CPB time, and DM.

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Key words: Coronary artery bypass surgery, anterior ischemic optic neuropathy

Özet

Anterior iskemik optik nöropati (AION) göz dışı cerrahi uygulanan hastalarda ortaya çıkan görme kaybının ender sebeplerinden birisidir. Kalp cerrahisinde AION insidansı %0.06 ile %1.3 arasında değişmektedir. Kalp cerrahisi sonrası görülebilen AION multifaktöryel bir hastalıktır. Etyolojide öne çıkan sebepler şunlardır: Uzamış kardiyopulmoner baypas (CPB) süresi, miyokardiyal iskemi, aortik kanülasyon ve klempleme esnasında oluşabilecek mikroemboliler, CPB ile ilişkili inflematuar cevap, aşırı hemodilüsyon, hipo ya da hipertansiyon, sistemik hipotermi, perioperatif yüksek kan şekeri değerleri. Bu olgu sunumunda koroner baypas cerrahisi sonrası AION gelişen bir olgu sunulmuştur. Diyabet, hipertansiyon ve 1999 yılında koroner arter baypas (CABG) cerrahisi öyküsü olan, 50 yaşında erkek hastaya kliniğimizde redo CABG operasyonu uygulandı. Postoperatif birinci gün, sağ gözde ani gelişen görme kaybı olduğunu ifade eden hastada görme alanının alt yarısında tama yakın görme kaybı tespit edildi. Yapılan fizik muayenede başka bir nörolojik bulgu saptanmadı. Preoperatif hemoglobin (Hgb) 12.8 g/dL, hematokrit (Htc) %40.0 ve eritrosit sedimentrasyon hızı 40 mm/h idi. Operasyon esnasında hastanın Htc değerleri %19.1-21.6 aralığında tutuldu. Preoperatif haemoglobin A1c %6.6 idi. Çoklu koroner arter revaskülarizasyonuna bağlı olarak CPB zamanı uzundu. AION görme kaybının önemli bir sebebidir ve iyileşme genellikle beklenmez ve iyileşmeyi sağlayacak bir tedavi henüz gösterilmemiştir. Genellikle 50 yaşın üzerindeki hastaları etkiler. Bu olguda, AION gelişmesindeki esas faktörlerin düşük Hgb ve Htc değerleri, uzamış CPB süresi ve diyabet olduğuna inanıyoruz.

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Anahtar sözcükler: Koroner arter baypas cerrahisi, anteriyor iskemik optik nöropati

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Introduction

Anterior ischemic optic neuropathy (AION) is a disease describing the infarction of optic nerve head, characterized by sudden painless loss of vision due to optic disc oedema, resolving to optic atrophy, in patients having cardiac surgery with cardiopulmonary bypass [1,2]. The incidence of AION, in cardiac surgery differs between 0.06% and 1.3% [2,3]. The etiology of AION following cardiac surgery with cardiopulmonary bypass is believed to be multifactorial such as, glaucoma or other ophthalmological problems, prolonged cardiopulmonary bypass (CPB) time and myocardial ischemia, general oedema during cardiopulmonary bypass, the risk for micro-embolization during aortic cannulation and clamping, the CPB-related inflammatory response, excessive haemodilution with low Hgb and Htc, hypo- or hypertension, systemic hypothermia, need for vasoactive medication and the perioperative irregular blood sugar values [2,4,5]. AION is a rare but a severe complication since no effective treatment is available.

Case Report

A 50-year-old man, with a history of diabetes mellitus (DM) for 17 years, hypertension, coronary artery bypass grafting surgery (CABG) in 1999, and percutan transluminal coronary angioplasty to right coronary artery in 2010, underwent a redo CABG in our department. His past ocular history was unremarkable. The preoperative blood pressure measured 100/60 mmHg, Hgb was 12.8 g/dl with a Htc of 40.0%, and the erythrocyte sedimantation rate (ESR) was 40 mm/h. The perioperative blood sugar levels were regular with oral antidiabetics, and the preoperative Haemoglobin A1c value of the patient was 6.6%. Multiple coronary artery revascularizaton was applied to the patient. The patient was perfused with a roller pump (Sarns 9000, Ann Arbor, MI, USA) at a flow rate of 2.4l/min.m^2 using continuous nonpulsatile flow. Systemic hypothermia was induced to approximately 28 ^oC. During CPB, blood glucose levels were maintained at less than 180 mg/dl and Htc between 19.1 and 21.6%. CPB time was 242 minutes and cross clamp time was 107 minutes. On the first postoperative day, the patient complained of a sudden, painless, loss of vision with visual field defect in his right eye (Fig 1a). On ophthalmic examination, the visual acuity was 5/10 in the right eye and 9/10 in the left eye. The left optic disc was oedematous nasally in the right eye (Fig 2a) and the left was normal (Fig 2b). The ESR rose to 97 mm/h. On the postoperative third and fourth days, hameodialysis was applied to the patient due to creatinine and urea levels, increasing from 1.23 mg/dL to 3.74 mg/dL and oliguria. Blood transfusion was not planned to the patient due to high urea and creatinine levels. The patient was discharged on the postoperative 14th day and on the control ophtalmic examination before discharge, the oedema of optic disc and the loss of vision, on the right eye, were permanent.

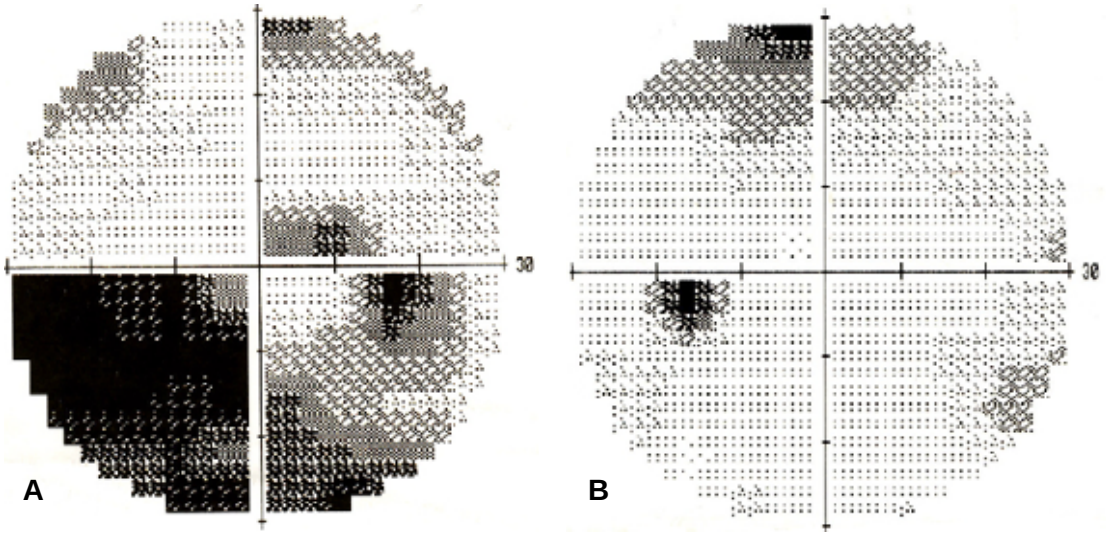

Figure 1. Visual field of the right eye (A), Visual field of the left eye (B)

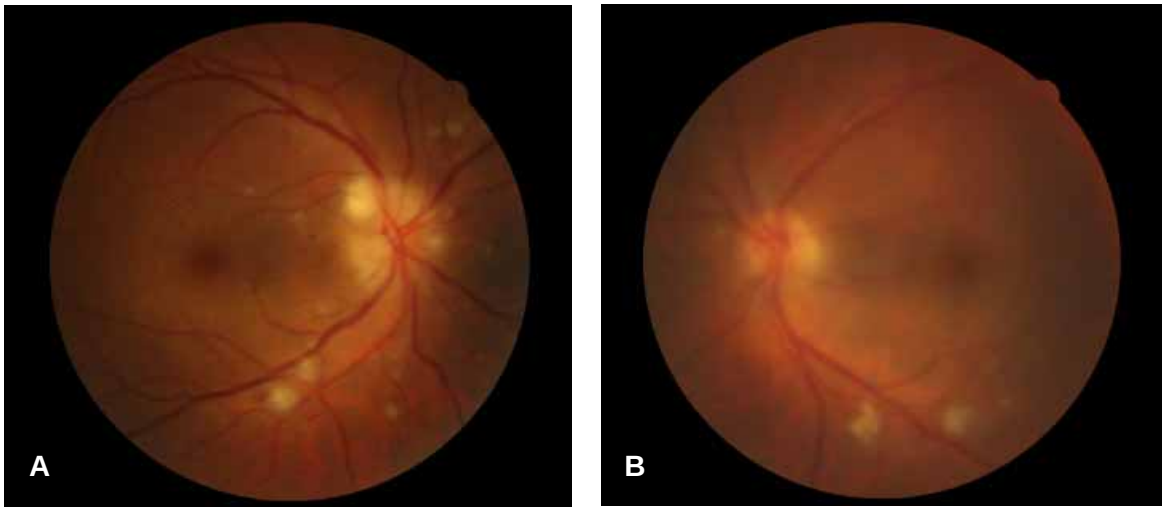

Figure 2. The right optic disc (A), The left optic disc (B)

Discussion

The development of AION after cardiopulmonary bypass was first described in 1982 by Sweeny et al [2]. The incidence of AION, in cardiac surgery differs between 0.06% and 1.3% [2,3]. AION usually affects patients over the age of 50 years. It is an important cause of visual loss in this age group; any recovery of vision is unusual and no treatment has been shown to aid recovery [1]. The pathogenesis is most likely multifactorial. Glaucoma, prolonged CPB time and myocardial ischemia, the risk for micro-embolization during aortic cannulation and clamping, the CPB-related inflammatory response, excessive haemodilution with low Hgb and Htc, hypo-or hypertension, systemic hypothermia, need for vasoactive medication and the perioperative irregular blood sugar values are commonly associated disorders [2,4,5]. In this case, the patient's blood sugar levels and Hgb A1c were not in high risk group, but the prolonged CPB time, due to multiple coronary artery revascularization, and the low Htc levels, during the operation, were the major factors resulting AION. Mansour et al's, reported the resolution of disc oedema and return of vision in two patients, after blood transfusion [6]. In this case, blood transfusion was not ordered to the patient due to high urea and creatinine levels. The usage of aggressive haemodilution for CABG with a Htc of 17-24% is a common process in cardiothorocic surgery. This process reduces the viscosity, and blood circulation is improved. On the other hand, due to decreased oxygen carrying capacity and relative hypoxia, haemadulition results in worse cognitive outcome. Mansour et al's, recommends the lowest acceptible Htc level in adult CABG to be 25% and 25-30% in diabetics [6]. In our case, the patient's low Htc levels and the prolonged CPB time, possibly have triggered optic disc ischemia. Besides, the patient was in risky group with an age of 50 and a history of DM for 17 years.

In conclusion, in this case, the major causes of AION were low Htc levels during the operation, 17-year history of DM, the prolonged CPB time. Besides, the haemodialysis, applied on the third and the forth days, is a considering event, marking the significance of the haemodynamic situation. In diabetic patients, Htc levels during the operation should be kept above 25%, the prolonged CPB time should be avoided as much as possible. When a AION is diagnosed, blood transfusion should be done.

Conflict of interest: The authors state that there are no conflicts of interest to be disclosed.

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