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A Case of Sudden Death in the Course of Intravenous Hyperalimentation

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Abstract

A 3-year-old girl suddenly died during intravenous hyperalimentation (I.V.H.) in the course of chemoradiotherapy for ganglioneuroblastoma. The cause of her death was cardiac tamponade caused by a myocardial injury. This injury was suspected to have been incurred by hyperosmotic solution from the I.V.H. catheter mislocated in the right ventricle. In this paper we report the patient's clinical course and pathological findings for preventing similar complications in the future.

Introduction

Complications with increasing application of intravenous hyperalimentation (I.V.H.) have been accumulatively reported[1,2,3]. The case of a sudden death from cardiac tamponade is reported in this paper.

Case Report

A 3-year-old girl was admitted to our hospital and operated on for a right adrenal ganglioneuroblastoma. On the 5th postoperative day, adjuvant chemotherapy and radiotherapy were begun. I.V.H. was started as a nutritional supplement on the 9th postoperative day. A silastic catheter, 1.11 mm in diameter, was inserted into the left subclavian vein using the puncture technique[4]. The catheter tip was placed in the right ventricle by accident. The parenteral nutritional solution consisted of: 14.5% dextrose, amino acids, electrolytes, and fat emulsion. One thousand and two hundred milliliters of this solution was dripped continuously for 24 hours. Fifty milligrams of cyclophosphamide was administered 3 times through the I.V.H. catheter. On the 8th day of hyperalimentation an E.C.G. was taken as part of a routine examination. Neither arrythmia nor ST-change was recorded. On the 15th day of hyperalimentation, the dripping rate of the solution slowed down spontaneously, and febrile episode up to 38.5°C was noticed. Antibi-

Key words: Sudden death, Intravenous hyperalimentation, Cardiac tamponade.
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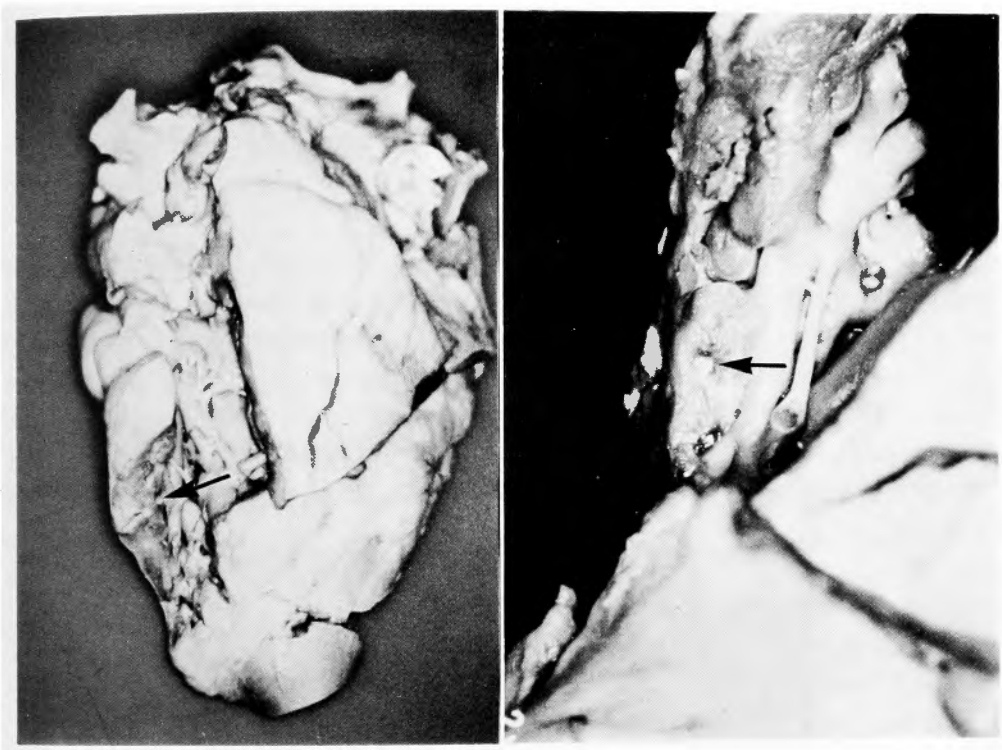

A B

Fig. 1. A. Wedge-shaped degeneration of right ventricular wall.
Arrow indicates the endocardial denuded point, which is suspected to be the site of contact with catheter tip.
B. Close-up view of the endocardial denuded point.

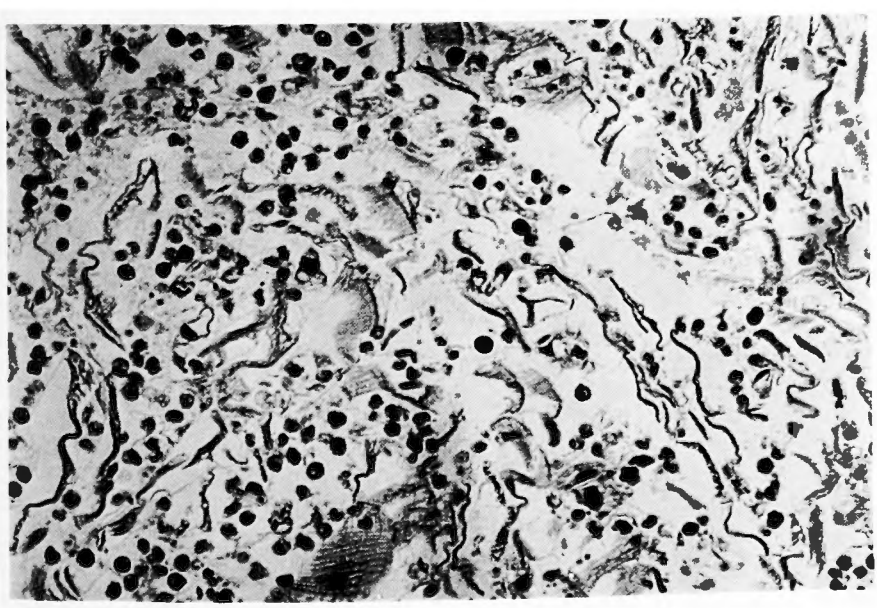

Fig. 2. Histological finding of the myocardial degeneration.
Cell infiltration is prominent, and the myocardial muscle fiber is destructed.

otics was administered through another peripheral venous route, but I.V.H. was not discontinued.

On the 20th day of hyperalimentation, a sudden onset of epigastric pain and nausea awakened the girl from a calm sleep. This epigastralgia and vomitting were followed 4 hours later by a sudden cardiac arrest from which the patient was unable to recover. An autopsy was performed 2 hours and 40 minutes after the death. The I.V.H. catheter had been removed before the autopsy.

The autopsy showed that the patient's pericardial cavity contained 62 ml of "milky fluid." The pericadial surface of the right ventricle and the atrium was discolored white. A dimple, where the endocardium was denuded, was found in the right ventricular cavity. Wedge-shaped myocardial degeneration was observed in the cut surface of ventricular wall through this dimple (Fig. 1). Histologically, the lesion showed destruction and neutrophils infiltration of the myocardium (Fig. 2). The content of the pericardial effusion was not examined chemically, but appeared to be quite similar to the parenteral solution which had been administered to the patient.

Fig. 3. Shadow of catheter (black arrow) and the tip (white arrow) observed in the plain abdominal X-ray.

Metastatic lesions of the original tumor were found in the vertebral column, dura mater and retroperitoneal lymph nodes. However, the cause of sudden death in this case could not be attributed to any metastatic lesion.

Discussion

Most of the complications associated with I.V.H. are either metabolic or catheter-induced[5,6]. The catheter tip was vaguely visible in the plain abdominal X-ray taken as part of a routine examination during the chemoradiotherapy (Fig. 3). However, this X-ray had not been taken for ascertainment of the position of the catheter tip. The catheter, when in the heart, has been shown to cause life-threatening complications[7]. In our case the catheter tip had adhered to the endocardium of right ventricle. Myocardial damage by the hyperosmotic solution caused extravasation of the I.V.H. solution, and eventually the cardiac tamponade. Franciosi[8] has reported 3 cases of sudden unexpected death due to an intraatrial indwelling I.V.H. catheter. The microscopic findings of his cases were quite similar to those of our case. Based on our experience we suggest the following precautions for prevention of similar hazardous complication.

1. The location of the I.V.H. catheter tip should be checked by adequately taken X-ray immediately after the placement of catheter. If the tip is not clearly visible in a plain X-ray, a small quantity of contrast medium should be infused into the catheter and additional X-ray taken.

2. If the patient becomes febrile or the rate of dripping of I.V.H. slows down spontaneously, extravasation of the infusate or thrombus formation in the catheter is suspectable. The location of the tip should be rechecked as described above. If necessary I.V.H. catheter is to be removed without hesitation.

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和文抄録

中心静脈栄養施行中の突然死の一例

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中心静脈栄養（以下IVHと略す）施行中の突然死症例を経験したので病理所見に検討を加えて報告する．症例は3才女児．神経節芽腫術後放射線化学療法施行中，IVHを併用した．IVH輸液は，糖濃度14.5%，アミノ酸，脂肪乳剤を混じてワンパック1200 ml/日とし，左鎖下静脈より挿入したシラスコンカテーテルから持続注入した．IVH開始後20日目，突発せる上腹部痛，悪心呕吐に続き，心停止をきたし蘇生奏功せずに死亡した．剖検所見では心嚢内に62 mlの白色液が貯留し，右室内前壁に直径2 mmの心内膜剝脱部が存在しこの部に一致して右室壁の変性が認められた．IVHカテーテルが右室内へ挿入されていたものと考えられ，先端が心内膜に付着し，高浸透圧輸液による心筋変性を生じてExtravasationを招来し，心タンポナーデによって死亡したものと診断された．