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PULMONARY EMBOLISM DURING SURGERY FOR A WILMS' TUMOUR (NEPHROBLASTOMA)

Case Report

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SUMMARY

During resection of a Wilms' tumour in a 10-year-old girl, sudden bradycardia, hypotension and cyanosis developed, leading to cardiac arrest. It was thought that part of the tumour had caused a pulmonary embolus. After prompt resuscitation, cardiopulmonary bypass surgery was started within 20 min. At operation the left pulmonary artery was blocked by a tumour embolus which was removed with a Fogarty catheter. The patient is still alive and well 27 months after her operation. We believe her to be the longest surviving patient of this type.

Pulmonary emboli can be recognized clinically, depending on their size and location. Postmortem examinations show that the rate of pulmonary embolism in adults is high, but that massive pulmonary embolism in children is rare.

Pulmonary emboli usually originate from venous thrombosis in the legs or pelvis, but air, fat, tumours and amniotic fluid can also cause pulmonary embolism. Pulmonary embolism following venous catheterization has occurred following damage to the catheter or vein.

We report pulmonary embolism during resection of a Wilms' tumour. The tumour had invaded the renal vein and became detached during resection.

CASE REPORT

A 10-year-old girl was admitted to the Department of Paediatrics at Hacettepe University Medical Faculty Hospital on February 12, 1979. Her family had first noticed abdominal distension 4 months earlier, but had not thought it to be important. Eventually she developed nausea, vomiting and diarrhoea. Her previous medical history was unremarkable. Physical examination revealed a 10×15 cm immobile mass in the left hypochondrium, and a second mass 10 cm in diameter which was mobile and lay medial to the first. Laboratory findings were normal. An i.v. pyelogram showed no infiltration. A liver and spleen scan showed reduced uptake in an area 6×6 cm. A diagnosis of Wilms' tumour was made and laparotomy planned for the following day.

One hour before operation the patient received i.m. pethidine 30 mg and atropine 0.3 mg. Anaesthesia was induced with thiopentone 150 mg and the trachea was intubated following suxamethonium 30 mg. Anaesthesia was maintained with oxygen 3 litre min^{-1}, nitrous oxide 4 litre min^{-1} and halothane 1%.

For the first 35 min of the operation, the heart rate and arterial pressure were stable. At this point, the tumour was removed and the patient developed a bradycardia which responded to atropine 0.25 mg i.v. While the tumour was being removed, it was noticed that it had invaded the renal vein and this was clamped close to the inferior vena cava. When the clamp was removed to allow resection of the tumour tissue invading the vein the surgeon noticed that part of the tumour had entered the inferior vena cava. Bearing in mind the likelihood of pulmonary embolism and the possible need for cardiopulmonary bypass, the surgeon quickly secured haemostasis and started to close the abdomen.

Towards the end of the operation, the patient's arterial systolic pressure decreased to 40 mm Hg, bradycardia recurred and she became cyanosed. After ephedrine 15 mg i.v., the systolic pressure increased to 90 mm Hg, but the cyanosis increased despite breathing 100% oxygen. Cardiac arrest followed and external cardiac massage was commenced. Atropine 0.5 mg was given i.v. and the heart restarted with a systolic pressure of 50 mm Hg and a heart rate of 140 beat min^{-1}. While the abdomen was being closed, preparation

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was made for thoracotomy and cardiopulmonary bypass.

Twenty minutes after the cardiac arrest the patient's chest was opened. At this time she was cyanosed and the arterial pressure was unmeasureable. On opening the pericardium, the right ventricle and main pulmonary artery were found to be dilated by increased pressure. After starting cardiopulmonary bypass with moderate hypothermia (32 °C), pulmonary arteriotomy was performed. A piece of tumour (4 × 3.5 × 1 cm) was removed from the left pulmonary artery with a Fogarty catheter. The right pulmonary artery was clear and the pulmonary artery was closed. After discontinuation of cardiopulmonary bypass, the patient's heart and pulmonary artery returned to a normal size. The systolic arterial pressure was 90 mm Hg, heart rate 140 beat min^{-1}, CVP + 11 cm H_2O and the patient was no longer cyanosed. Sodium bicarbonate 10 mmol and dexamethasone 8 mg were given and the chest was closed.

After operation the patient was digitalized and received IPPV (Bird ventilator) in the intensive care unit. Blood-gas analysis showed Pa_{O_2} 36.5 kPa, Pa_{CO_2} 3.2 kPa and pH 7.40. The tracheal tube was removed 4 h after operation.

On the 2nd day after operation the arterial systolic pressure was 110 mm Hg, heart rate 120 beat min^{-1} and CVP + 12 cm H_2O. Pa_{O_2} was 13.1 kPa, Pa_{CO_2} 2.9 kPa and pH 7.46. Four days after operation the patient was transferred to the ward. She developed pyrexia 2 days later and this lasted 10 days despite antibiotic treatment. No clinical or radiological lung disorder was detected.

The patient was discharged home on March 21, after which she received a course of radiotherapy and chemotherapy.

Twenty-seven months later she is alive and well with no sign of recurrence.

DISCUSSION

Wilms' tumour (nephroblastoma) is the commonest abdominal tumour in children. It is a malignant tumour of embryonic origin, developing from the mesoderm of the intermediate cell mass before it differentiates. It has been found in newborn infants, but usually presents a few years later. It has been reported that 39% of Wilms' tumours invade the renal vein but, although the tumour can reach the inferior vena cava and the right atrium, this is relatively rare (Anselmi et al., 1970). There was no inferior vena caval obstruction in our patient. When tumour is found in the inferior vena cava the frequency of massive pulmonary embolism is high (Emery, 1962; Arthur et al., 1973).

Kontecky reported a case of fatal massive pulmonary embolism during resection of a Wilms' tumour (Kontecky, Bonsko and Stejskal, 1978). A similar death under anaesthesia occurred when an 18-month-old girl with a vaginal tumour was being examined (Arthur et al., 1973). Postmortem examination showed that the tumour extended through the right iliac artery into the inferior vena cava, and a tumour embolus had obstructed the main pulmonary artery. Utley and others (1973) reported a case similar to our own, occurring during operation on an adult with a Wilms' tumour. When the heart was opened, a piece of tumour was found obstructing the tricuspid valve. The patient survived the operation, but died 3 months later from pneumonia.

Twenty-seven months after operation our patient is still well. We believe this to be the first long-term survivor following massive pulmonary embolism during resection of a Wilm's' tumour.

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EMBOLIE PULMONAIRE PENDANT UNE INTERVENTION CHIRURGICALE POUR UNE TUMEUR DE WILMS (NEPHROCHONDROME): *Rapport sur un cas particulier*

RESUME

Pendant la résection d'une tumeur de Wilms effectuée sur une petite fille de 10 ans, on a soudain constaté une bradycardie avec hypotension et cyanose, qui a entraîné un arrêt cardiaque. On a pensé qu'une partie de la tumeur avait causé une embolie pulmonaire. Après une prompte réanimation, on a, dans les 20 min qui ont suivi, effectué une dérivation cardiopulmonaire. Lors de l'opération, on a trouvé que l'artère pulmonaire gauche

avait été bloquée par une embolie tumorale que l'on a enlevée à l'aide d'un cathéter de Fogarty. La patiente est toujours en vie et se porte bien 27 mois après son opération. Nous croyons qu'elle est la patiente qui a survécu le plus longtemps à une opération de ce genre.

LUNGENEMBOLIE BEI OPERATION AN EINEM WILMS-TUMOR (NEPHROBLASTOM)

ZUSAMMENFASSUNG

Während der Resektion eines Wilms-Tumors bei einem 10-jährigen Mädchen entwickelten sich plötzlich Bradykardie, Hypotension und Cyanose, was zu Herzversagen führte, Man nahm an, dass ein Teil des Tumors einen Lungenembolus verursacht hatte. Nach prompter Wiederbelebung wurde innerhalb von 20 Minuten ein Eingriff bei Herz/Lungen-Bypass vorgenommen. Es zeigte sich, dass die linke Lungenarterie durch einen Tumor-Embolus blockiert war, der nun mit einem Fogarty-Katheter entfernt wurde. Die Patientin ist jetzt, 27 Monate nach der Operation, immer noch am Leben. Wir halten sie für die am längsten überlebende Patientin dieser Art.

EMBOLISMO PULMONAR DURANTE OPERACION QUIRURJICA RELATIVA A UN TUMOR DE 'WILMS (NEFROBLASTOMA)

Informe al caso

SUMARIO

Durante la extirpación de un tumor de Wilms en una muchacha de 10 años de edad se desarrollaron repentinamente bradicardia, hipotención y cianosis concluyendo en la paralización del corazón. Se pensó que parte del tumor había ocasionado un émbolo pulmonar. Después de la rápida resucitación se inició, al cabo de 20 minutos, la operación quirúrjica de desviación cardiopulmonar. Durante la operación la arteria pulmonar izquierda quedó bloqueada por un émbolo del tumor, el cual se extrajo mediante un catéter de Fogarty. La paciente sigue viva y sana después de 27 meses de la operación. Consideramos que dicha paciente es la que más ha sobrevivido a este tipo de intervención quirúrjica.