

Coarctation of the Aorta

By

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COARCTATION of the aorta is a constriction of the aorta, which is mainly of two types :

1. Preductal or infantile where the constriction is proximal to the ductus arteriosus.
2. Postductal or adult type distal to the ductus arteriosus. This is more common. (Fig. 1)

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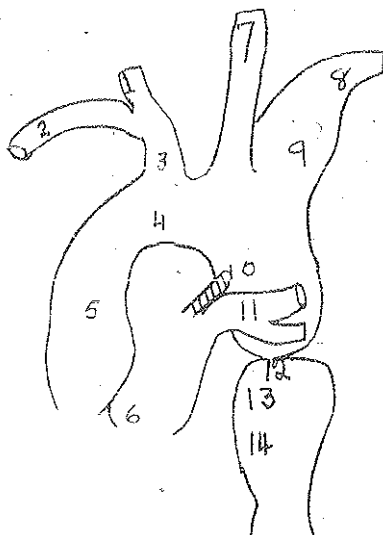


Fig. 1.

1. Rt Common Carotid
2. Rt Subclavian
3. Innominate Artery
4. Arch of the Aorta
5. Ascending Aorta
6. Pulmonary Artery
7. Lt Common Carotid
8. Lt Subclavian
9. Dilated Origin of Lt Subclavian
10. Ligamentum Arteriosum
11. Lt Pulmonary Artery
12. Post Ductal Coarctation
13. Post Stenotic Dilatation
14. Descending Aorta

It is usually congenital and diagnosed during childhood, but rarely may occur in the adult as a result of trauma or infection. It is diagnosed by the difference in pulse volume and delay in the arrival of the pulse impulse in the lower extremities, hypertension of the upper extremities and the deve-

lopment of collateral circulation about the chest and scapula. A systolic murmur is usually present. X-ray reveals left ventricular enlargement and rib notching as a result of bony erosion from the collateral circulation. Aortography reveals the constricted segment and ECG records left ventricular strain. This condition can result in complications such as sub-acute bacterial Aortitis, complications of hypertension (cerebro vascular accident, myocardial infarction and uraemia) and rupture of the Aorta and cardiac failure. Surgical treatment consists of excision of the involved segment with end to end anastomosis or replacement by a graft. However, in cases of technical difficulty in dissection, the condition may be alleviated by performing a bye-pass by means of a synthetic graft between left subclavian and the aorta.

Case Report

A boy aged 16, who joined the Army in the middle of 1966 was admitted to Thoracic Surgical Centre, Military Hospital, Aundh Camp on February 23, 1967 with following complaints :

1. Dyspnoea on exertion.
2. Giddiness and frontal headaches.
3. Diffuse chest pain radiating to the left arm.
4. Intermittent claudication.
5. Tingling of the digits.
6. Subjective sensation of the heart beats at rest.

In January 1967, he had developed a rise of temperature which subsided on treatment and then recurred again within a period of ten days. He was admitted to a local hospital and after a month's observation was sent to Thoracic Surgical Centre, Military Hospital, Aundh, for further investigation and treatment.

On examination the following observations were made :

1. His arms were found to be longer in comparison with the length of his body.
2. The temperature was normal.
3. Pulse—
 - (a) 88 p/m and regular.
 - (b) Arterial pulsations in the supra-sternal notch and neck were accentuated.
 - (c) Tortuous arteries were seen and felt in the inter-scapular regions.
 - (d) Right and left radial pulses were equal and synchronous.
 - (e) No pulsations in the abdominal aorta.
 - (f) Femoral, popliteal and dorsalis pedis arteries not palpable.
 - (g) Posterior tibials could be feebly felt on left side.

4. B.P.—Right arm 190/90 mm of Hg.
Left arm 190/90 mm of Hg.

B.P. not recorded in lower limbs as there were not palpable pulses in popliteal arteries.

5. Heart

- (a) Apex beat in the fifth space in mid clavicular line.
- (b) Left ventricular heave was present.
- (c) No thrill.
- (d) Both heart sounds normal.
- (e) Systolic murmur heard well on left sternal edge. Murmur also heard well in the inter-scapular area, left side

of the level of the third spine, not conducted down.

(f) No aortic diastolic murmur was present.

Investigations

The following investigations were done:

1. Blood—
Normal haemogram—No leucocytosis.
Haemoglobin—15.5 grams
ESR —12 mm. in 1st hour.
2. Urine—Normal
3. E.C.G.—revealed left ventricular hypertrophy and strain.
4. X-ray chest PA—revealed. (Fig. 2.)
(a) Rib notching.
(b) 'B' shaped aortic knuckle.
(c) Left ventricular hypertrophy.

X-Ray Chest P.A.

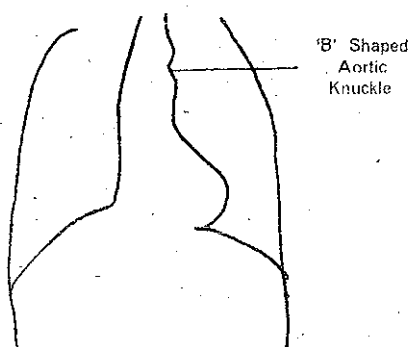


Fig. 2.

(d) Site of coarctation was seen well.

5. Fundoscopy revealed—

- (a) Increased tortuosity and light reflex of arteries.
- (b) No arterio-venous nipping.
- (c) No exudates.
- (d) No papilloedema.

Diagnosis

He was diagnosed as a case of Coarctation of the Aorta.

Treatment :

Surgery was decided on and he was posted for surgery on April 5, 1967.

Pre-operative operation

1. Rest in bed with minimum activity.
2. Diet. He was nourished on a salt free diet of 2500 C.
3. Pre-operative investigations consisted of :
(a) Blood Haemoglobin—15.5 grams %.
(b) Blood grouping and cross matching—'O' group.
(c) Blood Urea—27 mg %
(d) Urine—No abnormality.

4. Immediate pre-operative preparation :

- (a) Prophylactic antibiotics—Inj. Procaine Penicillin 8 lakhs × BD Inj. Streptomycin gm. 1 OD
- (b) Local preparation :
The chest and the back was shaved and cleaned with lotion cetavlon 1% and dressed with a sterile towel a day prior to the operation.
- (c) The patient was starved overnight.

5. Psychological preparation ;
The extent and risk of surgery was explained to him and he was reassured that he would be able to return to normal life after it.

6. A pre-anaesthetic examination was carried out on the day previous. He was found fit for anaesthesia and surgery.

Premedication

The following pre-medication was ordered :

1. Tab. Soneryl 1 × HS (on the night previous).
2. Inj. Pethedine 50 mg. ;
Inj. Phenergan 25 mg. ;
Inj. Hyoscine 0.4 mg. ;

(given at 6.15 hrs. on April 5 one hour before anaesthesia.)

Anaesthetic Technique by Major H.C. D'Netto—Usually the operation is performed with Arfonad, which maintains the blood pressure at convenient levels. As the drug was not available, it was decided in this instance to resort to Hypothermia, which also has a hypotensive effect. Hypothermia blankets were used and cooling was started at 7.00 hrs. and continued for 1½ hour till the oesophageal temperature lead registered 34°C. Cooling was then stopped and the temperature 'drifted' gradually to 30.8°C and again gradually rose to 33.4°C where it was maintained throughout the operation.

The operation was performed by Lt. Col. A.M. Ahuja, Adviser in Thoracic Surgery.

A left postero lateral thoracotomy was performed through the fourth interspace ligating about a dozen collateral vessels on either side of the incision. The lung was mobilised and a classical post-ductal coarctation with large collaterals was exposed. The origin of the left sub-clavian was found to be as big as the aorta itself. The ductus was not patent. The left sub-clavian and the aortic arch was mobilised up to the origin of the left common carotid and the ligamentum arteriosum was dissected off the pericardial edge, and doubly ligated intercostals on the left side were carefully dissected and doubly ligated and divided. The coarcted segment was clamped off and resected. The coarctation was found to be almost complete with a pin-hole lumen. End to end anastomosis with continuous 4/0 atraumatic silk sutures was performed. The chest was closed in layers with one intercostal drainage tube in situ.

Surgery commenced at 9.00 hrs. and was completed at 12.45 hrs.

Post-operative Care

The patient was warmed for half an hour till the temperature registered 36°C. He was shifted to the post-operative ward at 17.00 hrs.

Day of operation

The patient was kept flat in bed. Deep breathing and counting exercises were encouraged hourly. Nothing was given by mouth. I.V. fluids, blood 20-28 drops per minute and 5% glucose at 40 drops per minute were transfused. Post operative antibiotics consisted of Inj-Procaine penicilline 8 lakhs x BD and Inj. Streptomycin gm. 1. OD. Inj. Pethidine 50 mg. was to be given in case of pain. A half-hourly pulse and blood pressure record was maintained.

17.30 hrs. The temperature was 36.6° C, pulse 96 per minute, B.P. 126/80 mm. of Hg. and foot pulse was felt.

19.00 hrs. Pulse 80 per minute regular. The blood pressure had risen to 160/100 mm. of Hg. Inj. Serpasil 1 mg. was given. By 20.30 hrs. the patient complained of pain in the chest. Inj. Pethidine 50 mg. was given. It was repeated at 01.00 hrs. after which he slept till morning. Total fluid intake was 3300 ml. Total output was 120 ml. Urine—Nil. Drainage 120 ml.

April 6, First post-operative day

The patient was doing well. He was propped up in bed. His temperature was normal, pulse 104 per minute. B.P. 150/90 mm. of Hg. Femoral and posterior tibial pulsations on both sides were well palpable and synchronous and radial pulse on both sides were also palpable. The air entry into the lungs was good and the trachea central. Intercoastal drainage was 8 oz. Physiotherapy consisting of counting and deep breathing exercises was continued.

I.V. fluids were stopped and oral fluids started. A total of 2½ pints of blood and 3 pints of 5% glucose had been transfused. Oral fluids like tea, fruit juice, milk and water were started.

He had not passed urine and as all nursing measures to encourage micturition had failed, the bladder was catheterised at 13.30 hrs. and 900 ml. of urine was removed. Care was taken to keep the patient in bed with minimum movement to avoid deep venous thrombosis. His toilet was attended to in bed and nursing pre-cautions were taken to keep his skin clean. This was continued as long as he remained confined to bed i.e. 14 days.

He slept very well at night with Inj. Morphia 10 mgm.

Total fluid intake 1200 ml. Total output 1020 ml. Urine 900 ml. Drainage 120 ml.

April 7, Second post-operative day

His progress continued to be good. A chest X-ray by a portable machine showed full expansion of the lungs. The intercoastal drainage was removed. His antibiotics were changed to Inj. Terramycin 250 mg. x 12 hourly. He had passed urine. He continued to be on a fluid diet.

Total fluid intake 1590 ml. Total output 1260 ml.

April 9—15

The patient remained comfortable and continued to improve. His pulse rate varied between 80-100 and B.P. 158/110 to 124/80. He was put on normal diet on April 9, 1967. He was given Serpasil 1 T.D.S. for 3 days and then reduced to 1 B.D. Antibiotics were continued.

April 16

The tenth post-operative day, the wound sutures were removed. The union was good.

April 17-21

Improvement was continued

uninterrupted. Pulse rate was 80-88 and B.P. 120/70mm. of Hg. Serpasil was stopped.

April 22

On the 16th post-operative day, gradual ambulation was started. He was allowed to walk out and sit on the verandah.

April 27

The patient was completely ambulatory on 21st post-operative day. His pulse rate was now 76 per minute and B.P. readings were as follows :

Right arm — 110/80 mm. of Hg.

Left arm — 110/80 mm. of Hg.

Right thigh — 124/90 mm. of Hg.

No ventricular heave was present. There was no murmur in front or left suprasternal region.

May 1

An E.C.G. showed no appreciable change as compared to the pre-operative findings. The patient remained in hospital for another month under observation and then returned to normal life.

Conclusion

It may be appreciated that post-operative nursing care plays a vital part in the convalescence of a patient treated surgically. Vigilant attendance at all times is essential to detect the onset of post-operative complications. Strict bed rest must be adhered to, to avoid initiation of a leak from the anastomotic line. Accurate records help the doctor to advise the necessary treatment, and above all it is most important that a nurse keeps the patient reassured and avoids excitement at all times to ensure the best results.

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