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COARCTATION OF AORTA IN PREGNANCY

by

GEETHA S. RAO,* M.D., D.G.O.

NIKHIL S. MUNSHI,** M.D., D.G.O., D.F.P.

and

PRATIBHA R. VAIDYA,*** M.D., F.C.P.S., D.G.O., D.E.P.

Introduction

Association of coarctation of aorta with pregnancy is unusual. Coarctation is found to be 4 times more common in males than in females (Bedi, 1971). Pritchard (1953) calculated the incidence as 1:1,500 females (autopsy cases). Bedi and Kochar (1971) report an incidence of coarctation of aorta associated with pregnancy as 1:12,000 deliveries. We have reviewed 3 cases of coarctation of aorta associated with pregnancy in 24,852 deliveries which occurred during the years 1973-1978 at LTMG Hospital, Sion, giving an incidence of 1:8,284 deliveries.

The exact incidence of coarctation in pregnant women is not known. Of Abbot's (1928) 48 female autopsy cases, 6 were

known to have been gravid one or more times (Pritchard, 1953).

"The impressions of the several authors regarding the effect of pregnancy upon coarctation of aorta and its management have been most variable. No individual, however, has had an opportunity to observe personally enough cases to warrant the drawing of any definite conclusions" (Pritchard, 1953). Here we endeavour to present 3 cases of coarctation of aorta associated with pregnancy and discuss their management.

CASE REPORTS

Case 1

A 22 year old primigravida, was transferred from a peripheral hospital with H/o 7 months amenorrhoea with breathlessness and chest pain of 7 days duration. No H/o similar complaints in the past.

The patient was of average built, no pallor, edema feet +, no cyanosis. Pulse was 90/min. regular. Carotids, brachials, subclavian well felt. Both femorals were not felt. B.P. on both right and left upper extremities was 160/130

*Registrar.

**Reader.

***Prof. and Head of the Dept.

Department of Obstetric and Gynaecology,
L.T.M.G. Hospital and L.T.M.M. College,
Sion, Bombay 22.

mm of Hg. BP not recordable in lower limbs. An ejection systolic murmur was heard over precordium and intrascapular region.

Obstetric Examination

The patient was 28 weeks gravid with vertex presentation and good FHS.

INVESTIGATIONS: Normal haemogram, urine NAD, ECG LVH.

X-RAY CHEST: Notching of right 5, 6 and 7th, ribs bronchiectatic changes in the bases of lungs. Fundoscopy—tortuosity of arterioles.

Patient was put on haematenics, antihypertensives like adelphane, serpasil and digoxin. With antihypertensives she had a fluctuating BP of 130/90-150/100 mm Hg. Patient went into labour at full term. As head remained floating even at the end of first stage of labour, she was delivered under general anaesthesia by lower segment caesarean section. During induction, BP was 220/130 mm Hg. and serpasil injection was given to control BP. A female healthy baby weighing 2.6 Kg. was delivered. Post operative recovery was uneventful. Post-natally BP remained at 140/100 mm Hg. She was discharged 15 days after operation.

Case 2

Twenty-four year old, 2nd gravida, first para was transferred from a peripheral hospital for systolic murmur in precordium. Pulse 86/min. Radial, brachials and carotids well felt. Femorals were felt but had low volume with radio femoral delay. BP in both arms was 150/90 mm Hg and not recordable in lower limbs. There was a thrill in left parasternal region in 2nd and 3rd space and suprasternal area. Carotid thrill + grade II/VI ejection systolic murmur was heard conducted to carotids and back. No evidence of any valvular lesions.

The patient was 36 weeks pregnant, Vertex presentation, the Cervix was fully dilated and head was in mid-pelvic cavity. Patient delivered normally a healthy female baby weighing 2.3 Kg.

INVESTIGATIONS: ECG/NAD. X-ray chest notching of 5th rib on left side. Fundoscopy—Tortuosity of arterioles. Patient was normotensive postnatally and was put on only haematenics and antibiotics.

Case 3

Twenty-seven year old 4th gravida, 3rd para,

was admitted with deep coma at 28 weeks pregnancy. She was unconscious. Reflexes were poor. Pupils constricted but reacting to light. No meningeal signs. Pulse 120/min. Femorals not felt. BP 270/110 mm in upper limbs and not recordable in lower limbs. Uterus was 30 weeks size with vertex floating. FHS were regular. Fundoscopy showed bilateral papilloedema. Patient died within 6 hours after admission in spite of all resuscitative measures. Postmortem examination showed subarachnoid haemorrhage over both ventricles, clots around brain stem. Left ventricle of the heart was markedly hypertrophied Aorta revealed constriction 3/4" length after arch of aorta and part of aorta above showed hypertrophy and marked atherosclerosis.

Discussion

In coarctation of aorta, the site of coarctation depends upon the embryological defect. Depending upon this it can be classified as post-ductile and pre-ductile. In post-ductile, the constriction is between the 6th arch and point of fusion of 2 dorsal aortae. The constriction may be just below ductus aneriesus, immediately distal to the origin of subclavian artery—adult type (90%). In pre-ductile type, also known as infantile type (10%), constriction is present between 4th and 6th arches. In fact both are present in infancy, but so called infantile type commonly presents as heart failure in infancy because it is often associated with other congenital cardiac lesions (Oram 1961).

Coarctation produces a variable amount of obstruction depending upon the amount of residual patency and length of the constricted segment. Main rerouting pathways are via anastomosis between intercostals and superficial epigastric artery distal to the lesion and vertebral artery and internal mammary systems from the proximal aorta.

All the 3 cases in the present study belonged to younger age group, i.e., the oldest was 27 years old and the youngest

22 years old. One was a primigravida, the other 2 had 1 or more full term normal deliveries in the past.

Blood Pressure Changes

The fluctuations in the level of blood pressure follow the same pattern as that in a normal gravida, i.e. it falls during 2nd trimester and rises again in 3rd trimester (Dixon-Hartley, 1955). There is no rise of BP during labour or postpartum period (Goodwin, 1958). This is not universally true in each and every case. BP may remain high throughout the course of pregnancy or may remain normal throughout pregnancy or may rise for the first time in the postpartum period (Shanahan *et al*, 1958). In our cases, 2 patients had severe hypertension during the course of pregnancy of which one died of subarachnoid haemorrhage due to hypertensive encephalopathy and the third patient was normotensive during ante-intra and postpartum period.

The cause for brachial hypertension was originally thought to be due to mechanical obstruction itself, but later Steele (1969) showed that even if femoral systolic pressure is low or normal, femoral diastolic pressure was actually high in a few and he concluded that a generalized increase in peripheral resistance in coarctation accounts for a high brachial blood pressure. Bing *et al* (1948) thought that hypertension could be explained by damping of pulse wave by the obstruction and arterial collaterals. Friedman *et al* (1941) postulated the theory of renal ischaemia secondary to coarctation as the cause of hypertension.

Diagnosis of coarctation of aorta in all the 3 cases was made clinically and confirmed by investigations. Bedside diagnosis of this condition is fairly easy provided the clinician is aware of its possibility. This is possible if the femoral

arteries are routinely palpated in the young hypertensives in early pregnancy or when hypertension cannot be explained by toxæmia of pregnancy (Bedi, 1971).

The various diagnostic criteria are high brachial BP, femoral pulsations absent, weak or delayed by an average of 0.03 secs, visible collateral pulsations. Examination of cardiovascular system may reveal systolic murmur due to dilatation of ascending aorta, turbulence in the collaterals and murmurs due to other associated valvular lesions like AI, bicuspid aortic valve (25% cases) PDA etc. (Oram 1961). None of our cases had any associated cardiac lesions. X-ray chest may confirm the diagnosis of this condition in majority of the cases when they may show notching of ribs (Dick's Sing) or abnormal aortic knobs, which may be small, elongated or double. Heart itself may be within normal limits. ECG is normal in majority of cases or may show left ventricular enlargement. Only 1 of our cases showed left ventricular enlargement on ECG. Other special investigations like angiography are only needed to establish the exact site and extent of coarctation itself or to identify the complicating cardiac lesion and not to diagnose the condition (Bedi, 1971).

Management During Pregnancy and Labour

With the average life expectancy of 35 years and with death often associated with cardiac embarrassment or with the vascular lesions of aorta or cerebral arteries, it is only natural to fairly frequently anticipate the onset of symptoms or the progression of previously present symptoms over any 9 plus month period, whether pregnancy is or is not present (Pritchard, 1953). There is no question that pregnancy places an added temporary

burden on the diseased heart. However, one cannot say whether this burden is any greater with coarctation than with other heart diseases. Staghorn observed cardiac output during pregnancy and puerperium in cases of coarctation of aorta. He concluded that cardiac output increases as it does in normal pregnancy, the response to exercise is normal and collaterals are sufficient to bear the increased burden of pregnancy and exercise. Pritchard (1953) observed that some degree of cardiac failure occurred in one-fourth of the cases with the fatality rate of 2.5% due to cardiac failure. This observation makes it mandatory to consider all cases of coarctation to have moderate degree of cardiac disease. He advocates hospitalization of the patient routinely and that failure, if present, be treated medically. One of the cases in the present study was treated with antihypertensive agents and digoxin. Uranga Imaz *et al* (1958) found gratifying results with similar management. None of our patients developed toxæmia of pregnancy. This observation correlates with those made by Shanahan and Fernandes (1958) and Goodwin (1958).

The consensus regarding the management of pregnancy varies with different workers. Mendelson (1940) advocated routine M.T.P. in early months, whereas Pritchard feels that M.T.P. is justified only in those cases where failure has been already present and the procedure can be done vaginally. Mendelson (1940) prefers C.S. at term with sterilization if the coarctation is detected late in pregnancy. Benham (1949) advised C.S. at term to avoid any possible increase in BP during vaginal delivery. Pritchard (1953) found that maternal mortality rates were practically the same in both. So he advised vaginal delivery with shortened 2nd stage. Gordon and Watson (1958) considered

elective C.S. as the best method of delivery to reduce the possible risk of high BP in primigravida and allow normal delivery if the condition was detected after previous normal delivery. Goodwin (1958) found no justification for routine C.S. in all cases, as BP does not rise abnormally high in later months of pregnancy or during labour and no deaths have been reported during labour. One of our patient had a rise of BP during 1st stage of labour upto 250/120 mm of Hg and had to be given injectable antihypertensives. The commonest cause of death i.e., aortic rupture or dissecting aneurysm (25%) occurs in later months of pregnancy and these complications cannot be predicted beforehand. Hence CS should be considered only for obstetric reasons. In Bedi's (1949) 2 cases, 1 elective C.S. was done for high B.P. and 1 delivered normally. In our cases, 1 underwent C. S. for obstetric indication i.e. CPD. The other 2 had vaginal delivery. One patient was lost in 3rd trimester due to cerebrovascular accident following hypertensive encephalopathy.

Outcome of Pregnancy

In Pritchard's (1953) collected series of 79 cases, 31 patients delivered vaginally, 14 had C.S. Mortality rate was 6.5% for vaginal delivery and 7.1% for C.S. Goodwin (1958) reported overall mortality rate of 10%. This incidence compares not unfavourably with figures for rheumatic heart disease (grade 2) with pregnancy given by Jones (1951). He considers that in majority of the cases pregnancy is just a coincidental factor. Out of 3 cases reported here, 1 died at 32 weeks of pregnancy from subarachnoid haemorrhage (33%). The first reported death (1878) of pregnancy with coarctation was due to cerebral haemorrhage. Reifenteil *et al* (1947) reported relative incidence of

CVA as 11%. The most common cause of death in coarctation with pregnancy reported world over is rupture of aorta resulting from the cystic median necrosis and possibly hyperlipaemia—especially hypercholesteraemia associated with pregnancy.

Foetal Outcome

The perinatal outcome is not adversely affected per se. This may probably be due to protection afforded by coarctation of aorta to kidneys, adrenals, uterus and placenta, from pulsating hypertension (Shanahan *et al*, 1958). In our study, the average birth weight was 2.6 kg. and none of them showed signs of dysmaturity.

Role of Surgery

Surgical correction of coarctation during pregnancy has been attempted frequently in recent years and results are said to be encouraging. Peterson *et al* (1953) reported successful repair of coarctation of aorta in pregnancy. It may be more prudent to defer the operation until after delivery (Goodwin, 1958). Surgery should be considered seriously if aortic aneurysm is threatening to develop or if infective endarteritis has developed. In such cases, preoperative antibiotic therapy is always given. Mortenson and Ellsworth (1965) compared the course of pregnancy in patients with coarctation of aorta who underwent operation with those who were not operated. Though fertility is not impaired by the coarctation, obstetric complications like abortions, stillbirths etc. were significantly more common in unoperated cases i.e. 70% than with the operated group 10%. It was postulated that markedly decreased pulse pressure in the aorta or overtaxed collateral circulations supplying abdominal organs are inadequate to meet with the demands of growing foetus and affects adversely. Blood pressure may remain elevated even

after surgery in some due to organic changes developing in distal arterial bed.

Summary

Three cases of coarctation of aorta with pregnancy treated at a teaching hospital in Bombay are reported and literature on this subject is reviewed.

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