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## RESEARCH ARTICLE

### A VERTICAL ALPHA LOOP ( $\alpha$ -LOOP) AND U-LOOP OF CERVICAL SUBCLAVIAN ARTERY IN AN OCTOGENARIAN

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#### ABSTRACT

We present an interesting and unusual vertical alpha loop ( $\alpha$ -loop) of the subclavian artery in the neck with simultaneous presence of proximal U-loop during transradial coronary angiogram in an octogenarian presenting with Non-ST elevation myocardial infarction (NSTEMI) with ongoing angina. Tortuosity prevails during transradial coronary angiogram in octogenarians but presence of such an alpha loop ( $\alpha$ -Loop) in the subclavian artery pushing the subclavian artery in to the neck (cervical subclavian artery) has not been described so far in the literature. Although the loop could be crossed with a terumo wire and a tiger catheter, transradial coronary angiogram could not be accomplished due to presence of extreme tortuosity in the form of alpha loop ( $\alpha$ -loop) in the cervical subclavian artery even with the use of extra stiff wire, guide catheter and parallel wire technique<sup>1</sup>. Transradial coronary angiogram was accomplished from left transradial access. Young interventionalists should keep the possibility of such an extreme tortuosity in the form of alpha loop ( $\alpha$ -loop) in subclavian artery which will preclude conventional right transradial coronary angiogram and would render for an alternative vascular access to accomplish coronary angiography.

## INTRODUCTION

We present a rare and unusual vertical alpha loop ( $\alpha$ -loop) of the cervical subclavian artery with proximal U-loop during transradial coronary angiogram in an octogenarian presenting with Non-ST elevation myocardial infarction (NSTEMI) with ongoing angina. She was non-diabetic and hypertensive without any family history of coronary artery disease. Tortuosity of the radial artery prevails in good number of patients with coronary artery disease beyond 7<sup>th</sup> decade of life. Octogenarians, female sex are more likely to have tortuosity as compared with younger populations and male sex. As the age advances artery loses its elasticity, arteriosclerosis prevails and artery kinks in its due course. It is often difficult to cross the radial loop with conventional terumo wire and tiger catheter. Balloon assisted tracking (BAT) and parallel wire technique sometimes help in crossing the loop and accomplishing successful transradial coronary angiogram. Our case is the utmost and extreme form of tortuosity of subclavian artery making an alpha loop ( $\alpha$ -loop) and this loop pushed the subclavian artery into the neck (Cervical subclavian artery) which precluded right transradial coronary angiogram and it was accomplished from the left side.

**Case:** A 84-year-old female presented to the cardiology outpatient department with rest angina since last 16 hours with diaphoresis and shortness of breath. She was non-diabetic, and hypertensive without any family history of coronary artery disease. During presentation her blood pressure was 164/94 mm Hg with pulse rate of 92 beats per minute. Baseline ECG revealed symmetric T wave inversion in anterior and inferior precordial leads. Troponin T was positive and echocardiography revealed regional wall motion abnormality in left anterior descending coronary artery territory with borderline left ventricular systolic dysfunction (EF-55%). She had ongoing angina which was not responsive to sublingual nitrate and was subjected for right transradial coronary angiogram. Terumo wire was ascending into the neck repeatedly for which subclavian injection was taken which revealed presence of proximal U loop in the subclavian artery (Fig 1) with presence of alpha loop ( $\alpha$ ) of the subclavian artery (Fig 2 and 3) which has pushed the subclavian artery into the neck for which terumo wire was repeatedly going high into the neck. With deep inspiration, terumo wire crossed the subclavian-innominate junction and was parked in the aortic root. Fluoroscopy revealed the presence of cervical alpha loop ( $\alpha$ ) of the subclavian artery (Fig 3). Coronary angiogram could not be accomplished from the right side inspite of best effort and maneuverer as tiger catheter was terribly kinking

proximally. With Amplatzer extra stiff wire, use of guide catheter and also even with the use of parallel wire technique, coronary angiogram could not be accomplished from the right side and left transradial coronary angiogram was done with conventional terumo wire and tiger catheter. Coronary angiogram revealed ectatic Left main coronary artery (LMCA) with diffusely diseased left anterior descending coronary artery (Fig 4) and ectatic right coronary artery (RCA) (Fig 5). Patient was discharged with optimal medical therapy (antiplatelets, statin, betablocker and nitrate) and was doing well in follow up. Our case is a rare description of the presence of cervical alpha loop ( $\alpha$ -loop) with proximal U-loop in the subclavian artery which has not yet been described in the literature and it should be in the mind of young interventionists while proceeding for conventional right transradial coronary angiogram in extremely elderly females.

length guide wire. Judkins or Amplatzer catheter should not be used while crossing the tortuosity as these are most notorious even to produce radial artery avulsion due to presence of more angled tip<sup>5,6</sup>.

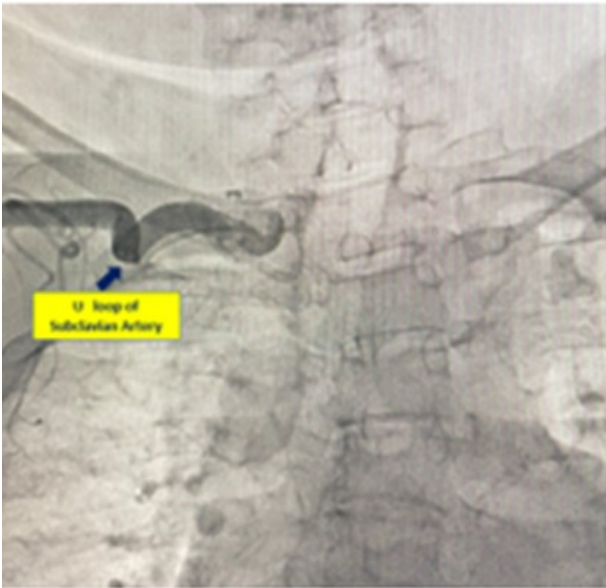


Fig. 1. Proximal U loop of the Subclavian Artery



Fig. 2. Ascending Limb of the alpha loop of the Cervical subclavian artery



Fig. 3. Fluoroscopic Alpha loop of the cervical subclavian artery



Fig. 4. AP caudal view showing ectatic LMCA with diffusely diseased LAD

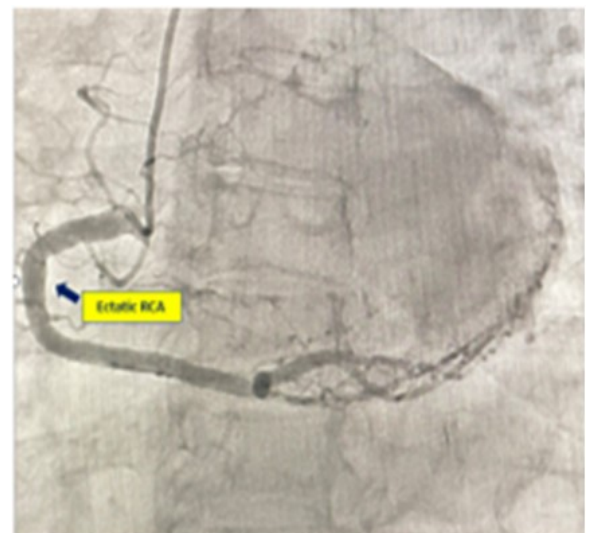


Fig. 5. LAO view revealing ectatic RCA

## DISCUSSION

Radial artery loop is encountered in 13.2% of transradial coronary angiograms and account for almost 14% of transradial angiogram failure<sup>2</sup>. Most often the radial artery anomaly is crossed with coronary guide wire, balloon assisted technique<sup>3,4</sup> or parallel wire technique. In spite of the presence of radial artery anomalies, complications occur in only 1% of cases due to recent advances in technique and hardware. Difficult tortuosity is crossed with coronary guide wire and multipurpose catheter (MPA) and then it is exchanged with exchange

The alpha loop ( $\alpha$ -loop) of the brachial artery was crossed with conventional terumo wire and tiger catheter but it was not negotiating the subclavian and innominate junction. With breath held in inspiration, the terumo wire crossed the subclavian innominate junction. This  $\alpha$ -loop restricted manoeuvring the tiger catheter to engage the LMCA or RCA as it was kinking proximal to it. The wire was upgraded to an Amplatzer Superstiff wire (AES) and for LAD Extra back up (EBU) guide catheter was used and for RCA, Judkins right (JR) guide catheter was used. Even with the use of AES wire and stiffer guide catheters, the cervical alpha loop could not be straightened. A parallel routine diagnostic wire also was kept in an attempt to straighten the alpha loop but it also could not achieve the same. Left transradial coronary angiogram was done which revealed ectatic left main coronary artery (LMCA) with diffusely diseased left anterior descending coronary artery (LAD) and ectatic right coronary artery (RCA). Although radial anomaly is well described in literature, subclavian anomaly is not so common to encounter in routine clinical practice. Alpha loop of the subclavian artery in the neck has not been described in the literature so far. It is unwise to traverse this alpha loop with Amplatzer guide catheter as the curved tip of the Amplatzer guide catheter may cause dissection or perforation of the cervical segment of the subclavian artery. Gentle forward push is the rule during intervention of such extreme tortuosity. To image in difficulty is the rule during vascular intervention; if at all any difficulty occurs during antegrade crossing of the loop or the course of the wire looks abnormal, it is always better to inject 2-5 ml gentle contrast injection and visualise the real issue happening there and proceed further. Elderly females often pose problem from obtaining a vascular access till completion of transradial angioplasty due to presence of tortuosity but most often it is overcome with use of coronary guide wire, balloon assisted technique (BAT), parallel wire technique, use of Amplatzer Superstiff wire (AES) or with the use of stiffer or heavier guide catheters. Presence of  $\alpha$ -loop most often precludes successful angiography and angioplasty due to proximal catheter kinking during manoeuvring the catheter for engagement of LMCA and RCA. Pigtail assisted tracking<sup>7</sup> is another method used during navigating a loop. 5F pigtail is loaded inside a 6F guide catheter and pigtail is tracked across the loop to prevent the razor blade effect of the guide catheter tip and guide catheter induced perforation. This is also otherwise known as mother and child technique. 5F Judkins right catheter sometimes achieves success in traversing difficult loop<sup>8</sup>. Contralateral radial access is accessed with more incidence of success as it is rare to encounter bilateral radial artery loop which is encountered only in 15% of cases and successful coronary intervention is accomplished from contralateral radial artery in 85% of cases.<sup>9</sup>

Radial arteriovenous fistula, radial artery dissection, perforation, avulsion and radial artery occlusion are known complications of difficult transradial intervention with presence of radial artery loops. Radial artery occlusion occurs in 28-31% of cases of difficult transradial coronary intervention with radial artery anomaly or loop<sup>10</sup>. Cobra loop of the subclavian at the subclavian innominate junction<sup>11</sup> and arteria lusoria are two known anomalies of the subclavian artery but alpha loop ( $\alpha$ -loop) of the subclavian artery has not been described so far in the literature. Presence of such extreme tortuosity in the form of  $\alpha$ -loop precludes successful transradial coronary angiogram and angioplasty and gives second thought for the interventionist for a different vascular access, most commonly the left transradial access.

## CONCLUSION

Our case is an extreme rare description of an alpha loop ( $\alpha$ -loop) of the subclavian artery in the neck (Cervical subclavian artery) with simultaneous presence of proximal U-loop during transradial coronary angiogram in an octogenarian which has not been described so far in the literature. Although the loop could be crossed with a conventional terumo wire and a tiger catheter with deep inspiration and breath holding, transradial coronary angiogram could not be accomplished due to presence of such an extreme tortuosity in the form of alpha loop ( $\alpha$ -loop). Young interventionists should keep in mind of such an extreme tortuosity in the form of alpha loop ( $\alpha$ -loop) which would render them for an alternative vascular access to accomplish coronary angiography.

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