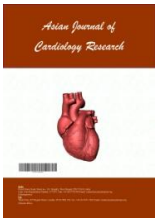

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Navigatinga Hostile Subclavian Loopduring Trans-Radial Angiography

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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Case Study

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ABSTRACT

Hostile anatomy of the subclavian artery (severe tortuosity and/or heavy calcification) remains a significant obstacle for the trans-radial approach during coronary angiography and interventions. Herein we report a case of trans-radial angiography with a hostile subclavian loop which could not be negotiated by .035 Terumo wire, extra stiff Amplatz wire, balloon assisted tracking [BAT] technique and was ultimately negotiated by buddy wire technique with a .014 coronary wire and Amplatz extra stiff wire.

Keywords: Hostile subclavian loop; hostile; angiography.

1. INTRODUCTION

Radial artery access is associated with a significant reduction of vascular access site complications and lower mortality rate compared with femoral artery access in patients with acute ST-elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (PCI) [1]. Improved techniques and better understanding of how to handle tortuosity encountered in the radial, brachial, or subclavian artery are needed to overcome these frequent causes of access failure [2]. Balloon-assisted tracking (BAT) is a new technique that has been recently developed to overcome tortuosity in the arteries of the upper extremity f3].

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2. CASE REPORT

A 58 yrs old lady known case of chronic kidney disease on haemodialysis, hypertensive was planned for renal transplant. Her preoperative echocardiography workup revealed severe left ventricular dysfunction [LVEF30%], global hypokinesia and severe PAH [PASP70MM]. In view of age, LV dysfunction and symptoms of dyspnoea on exertion class 111 and chest heaviness she was planned for trans-radial angiography. Radial artery was cannulated with 5fr glide sheath but .035 Terumo wire could not navigate the loop in subclavian artery [Fig 1]. A .035 Amplatz-extra stiff wire was able to enter aortic arch but could not progress further [Fig. 2].Selective angiography revealed no dye flowing beyond subclavian loop [Fig. 3].Then the loop was traversed with .014 BMW wire and balloon assisted tracking with 2-10mm balloon inflated at 4 atm was tried but the 5f xb guiding catheter could not negotiate the loop [Fig. 4]. Then a Amplatz-extra stiff wire was introduced as a buddy along with the .014 coronary wire and it entered the ascending aorta [Fig. 5]. Then a tiger catheter was traversed over the Amplatz wire and then the coronary wire was removed. Left coronary injection revealed 50% stenosis in mid LAD [Fig. 6]. The right coronary artery could not be hooked with 5F tiger,5FJr and 5FAl1 and all catheter exchanges were done with - extra stiff wire [Fig. 7a, 7b, 7c]. Non- selective injection with 5FAr1 catheter revealed a normal anomalous right coronary artery [Fig. 8].

3. DISCUSSION

Hostile anatomy of the subclavian artery remains an important limitation of the trans-radial approach in coronary angiography and interventions. This unfavourable anatomy often determines a need to switch to the femoral or contralateral radial approach in order to complete the procedure. The major determinants of a hostile subclavian artery are severe tortuosity of the vessel and/or heavy calcification or congenital anatomic abnormalities, such as arteria lusoria [4].

Severe tortuosity of the subclavian arteries has been found in 6–10% of patients undergoing a trans-radial approach. If a standard 0.035-inch J-wire or Terumo wire is unsuccessful, then one should consider using a torqueable atraumatic 0.035-inch wire, such as a Wholey guidewire (Medtronic) or Magic Torque guidewire (Boston Scientific Corporation), followed by either a 0.014-inch angioplasty wire or 0.025-/0.035-inch hydrophilic wire if unsuccessful.

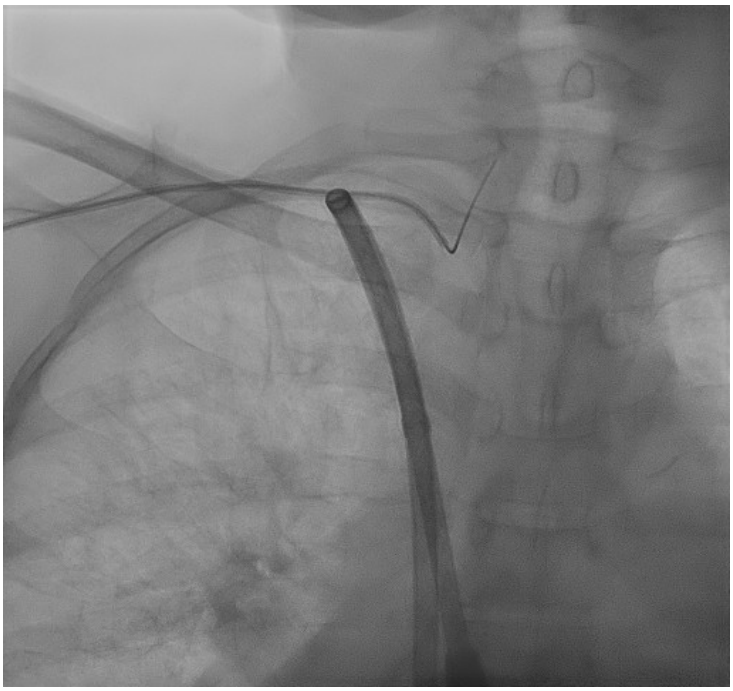

Fig. 1. Terumo wire

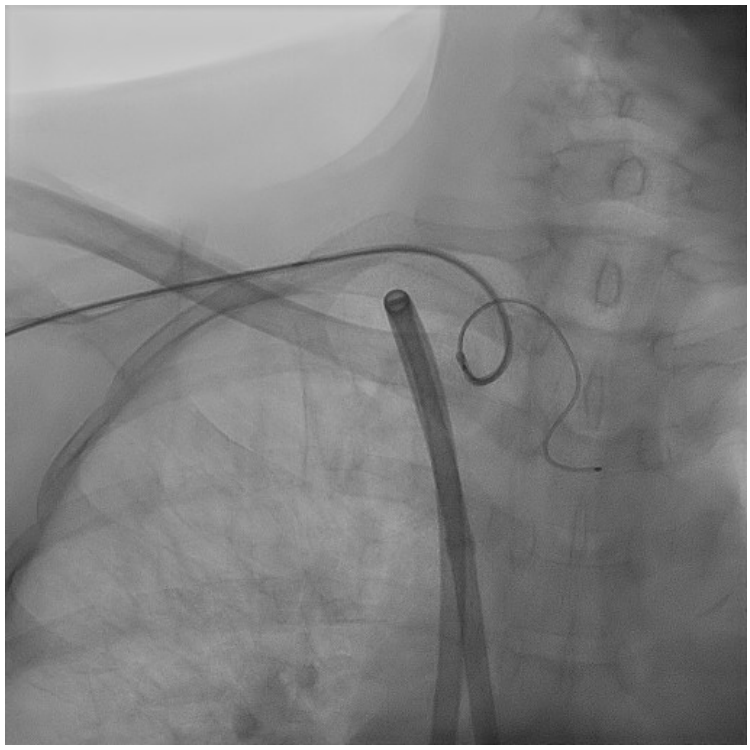

Fig. 2. Amplatz-extra stiff wire traversing the loop

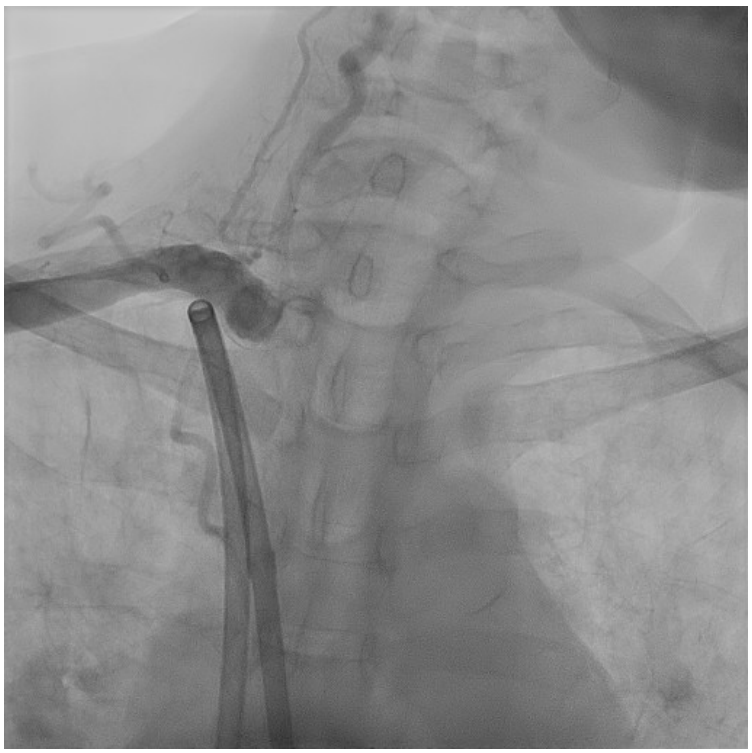

Fig. 3. Check shot of subclavian loop

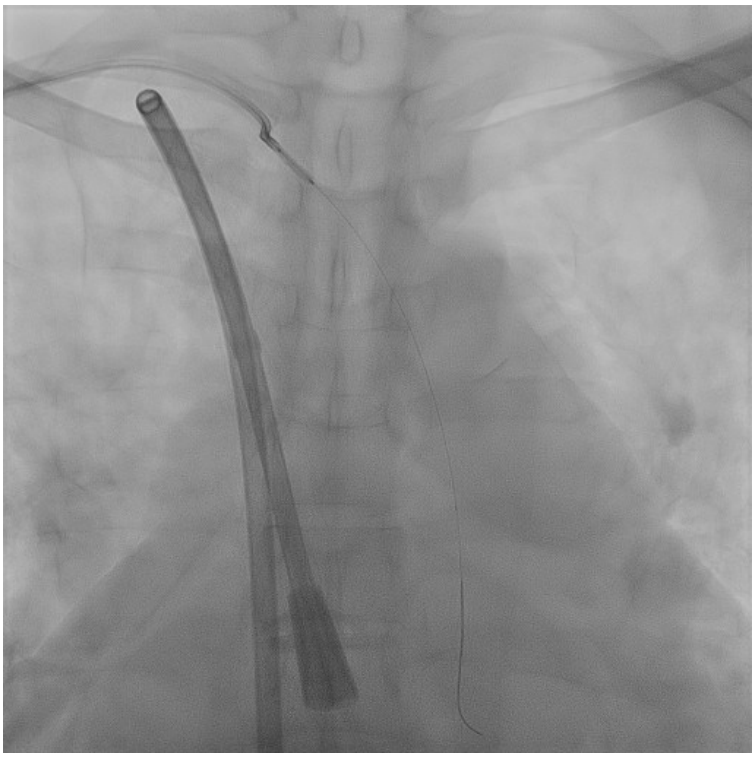

Fig. 4. Balloon-assisted tracking

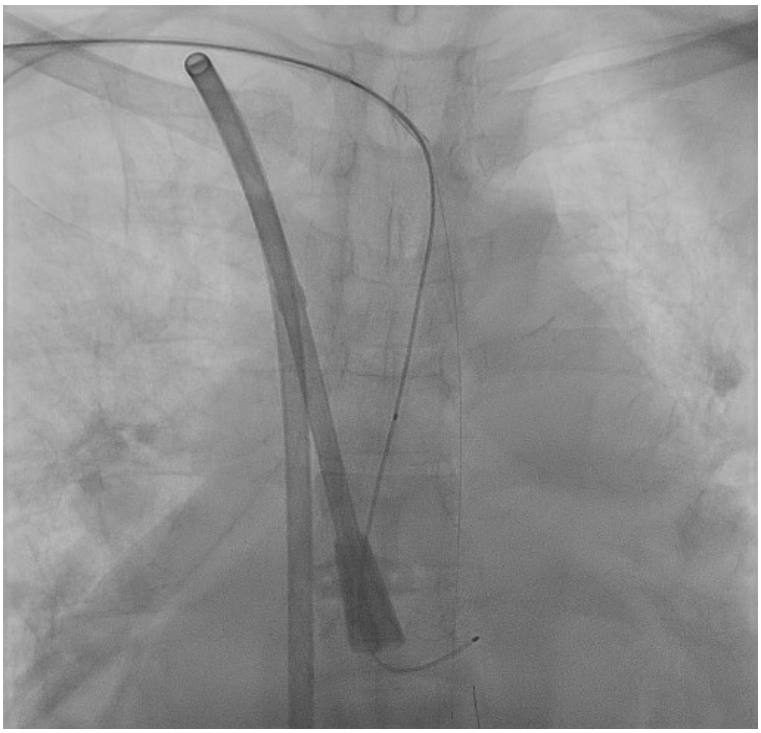

Fig. 5. Buddy wires Amplatz-extra stiff and ptca wire

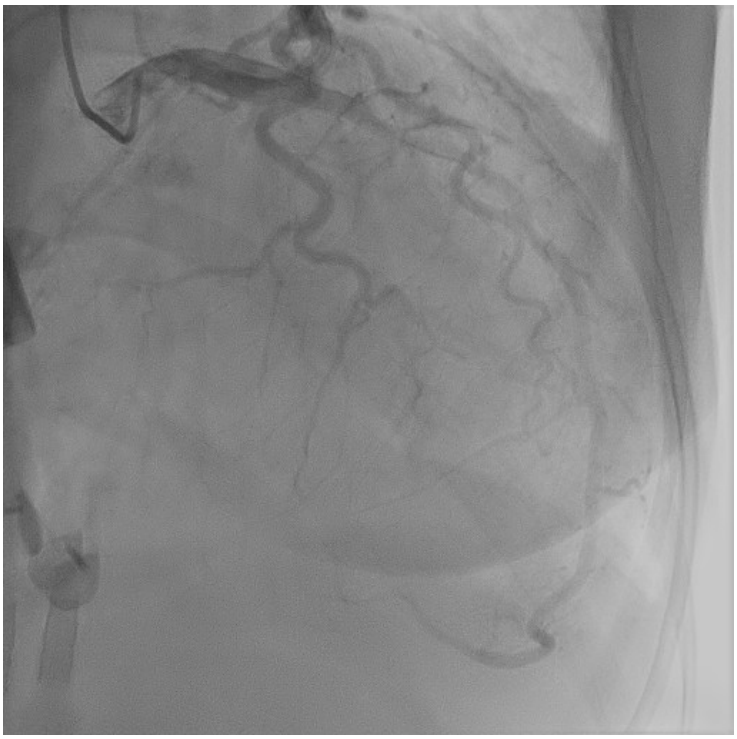

Fig. 6. LAD 50% mid

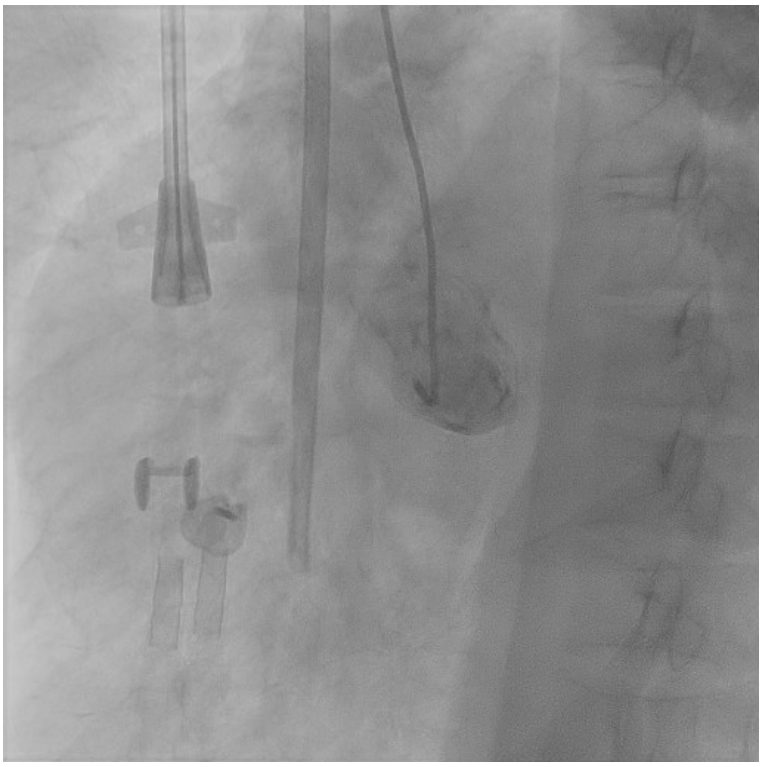

Fig. 7a. 5fr jr catheter

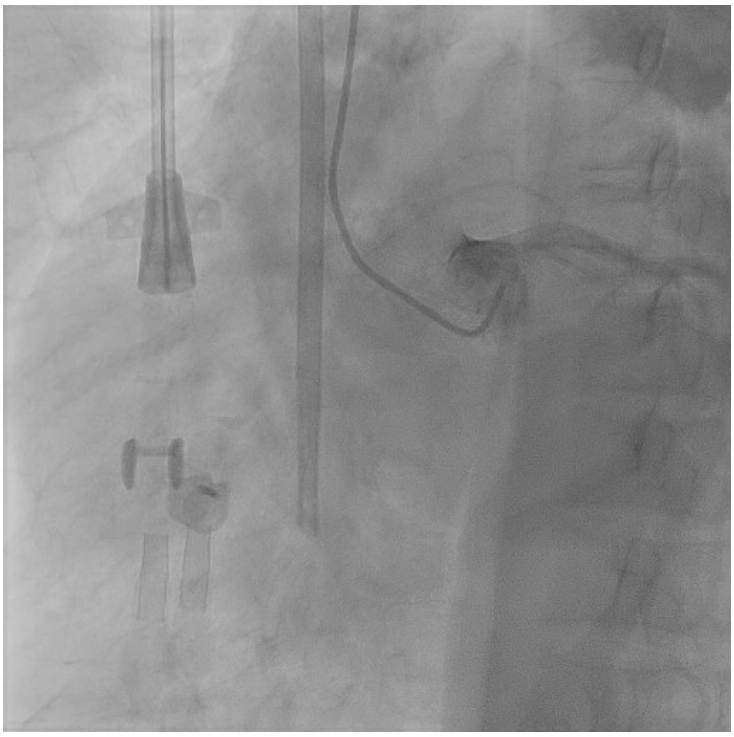

Fig. 7b. Tiger catheter

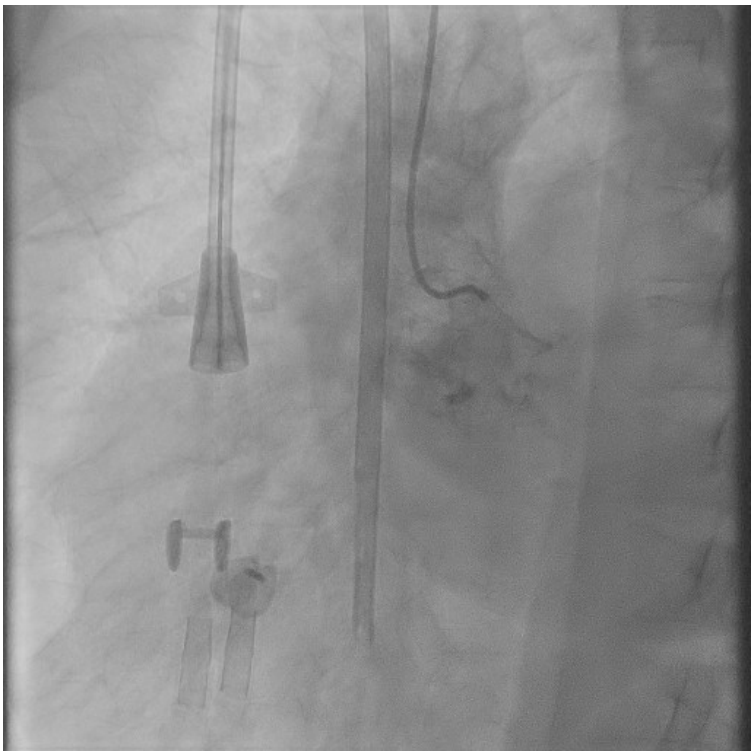

Fig. 7c. Amplatz al1 catheter

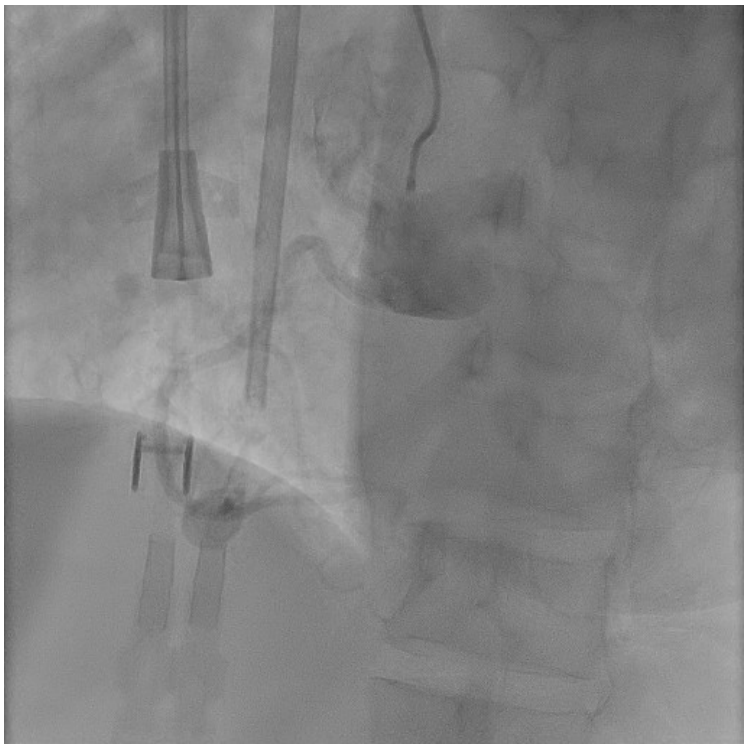

Fig. 8. Amplatz ar1 catheter

Another more recently developed option is balloon-assisted tracking, which was first described by Patel et al as a safe and effective method for crossing anatomic difficulties from a radial approach [5]. A coronary angioplasty balloon (1.5 mm for a 5-F catheter; 2 mm for a 6-F catheter) is placed at the end of a catheter with half of the balloon exiting the distal tip of the catheter (total balloon length 15 or 20 mm). The use of both semi-compliant and compliant balloons has been described for this technique. The balloon is then inflated to 4 to 6 atm and the balloon-catheter complex is advanced over a guidewire.

If the loop is crossed with a wire but there is difficulty straightening the loop for the safe delivery of 5-/6-F diagnostic or guide catheters, then mother-daughter strategies can be employed to navigate past the anomaly. Garg et al described a pigtail-assisted tracking method where a 5-F pigtail catheter is loaded within a 6-F guide catheter [6]. The distal pigtail is then extended outside the guide and tracked over the wire and through the loop. The benefit of this approach is that it can reduce the “razor-blade effect” of a guide catheter tip as it crosses the tortuous portion of a radial loop.

Additionally, an operator could consider newer, more specialized wires such as a 0.035-inch, 1.5-mm Glidewire Baby-J hydrophilic-coated guidewire (Terumo Interventional Systems), which can provide the lubricity of a hydrophilic wire while maintaining the safety of a small trackable J-tip [7].

We begin with a general description of the technique. The manoeuvre is based on the advancement of an additional 0.035-inch hydrophilic diagnostic guidewire (Radifocus Stiff, Terumo) from the radial artery to the aorta in parallel with the catheter and initial diagnostic guidewire. Once both guidewires are positioned in the aorta, the catheter is advanced on one of them; this guidewire is then removed. The companion guidewire remains in place in the aorta parallel to the catheter and the loop or tortuosity is straightened, which facilitates catheter manipulation, stability, and support. As precautions, the guidewire should be supported on the aortic valve with its distal end beyond the coronary ostia. In addition, when catheter exchange is required, the position of the guidewire should be actively maintained to avoid its dislodgement [8].

4. CONCLUSION

In our case we were not able to navigate a hostile subclavian loop by the described techniques like Terumo, Amplatz-extra stiff wires and the balloon assisted tracking technique. We were successful by using Amplatz-extra stiff wire as a buddy to a .014 ptca wire as a parallel wire technique and were able to negotiate the subclavian loop successfully.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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