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BaLloon Assisted Sliding and Tracking of GuideLiner Catheter (BLAST-G) to successfully deliver stent in a calcified, tortuous lesion: case report

Zastosowanie techniki *BaLloon Assisted Sliding and Tracking of GuideLiner* (BLAST-G) do skutecznego umieszczenia stentu w zwapniałej zmianie o krętym przebiegu — opis przypadku

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Abstract

GuideLiner (Vascular Solutions Inc., USA), GuideZila (Boston Scientific, USA) and Heartrail (Terumo, Japan) are the guide extension or mother-in-child catheters, which enhances guide support and therefore ease device delivery in tortuous, calcified vessels. In cases when the GuideLiner catheter cannot be advanced even with balloon anchoring technique, we slided the GuideLiner over inflated semi-compliant at medium pressure, facilitating its tracking over the workhorse wire through tortuous and balloon anchoring technique. Here, we describe a technique called BaLloon Assisted Sliding and Tracking of GuideLiner (BLAST-G) to successfully deliver the stent in proximal left anterior descending artery in a 73-year-old female patient suffering from chronic stable angina.

Key words: balloon assisted sliding and tracking, balloon anchoring technique, calcified lesion, GuideLiner catheter

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Introduction

With the advent of improved hardware and refinement in technology, intervention cardiologists are able to perform complex percutaneous coronary intervention (PCI). Tortuous and calcified lesion is the phantom menace despite enhanced stent delivery profile, as stent delivery can still be a problem in such scenario, responsible for failure in five per cent of cases and increased complications [1]. The GuideLiner catheter, a mother-and-child catheter, which acts as an extension of guide catheter, can be pushed deep down into the coronary artery, therefore providing excellent support and facilitating stent delivery [2, 3]. This may not only be difficult, as the sharp edge of the guide catheter tip produces a "razor blade effect", which can prevent the guide catheter navigation and sometimes can lead to dissection and rarely perforation [4].

Case report

A 73-year-old female with past history of diabetes and hypertension presented with exertional angina Canadian Cardiovascular Society (CCS) class II of three years duration with recent worsening in past three months, despite guideline medical treatment. Her tread mill test was strongly positive for reversible ischaemia. Her physical examinations and biochemistry were all unremarkable. Electrocardiogram revealed ST-T changes in precordial

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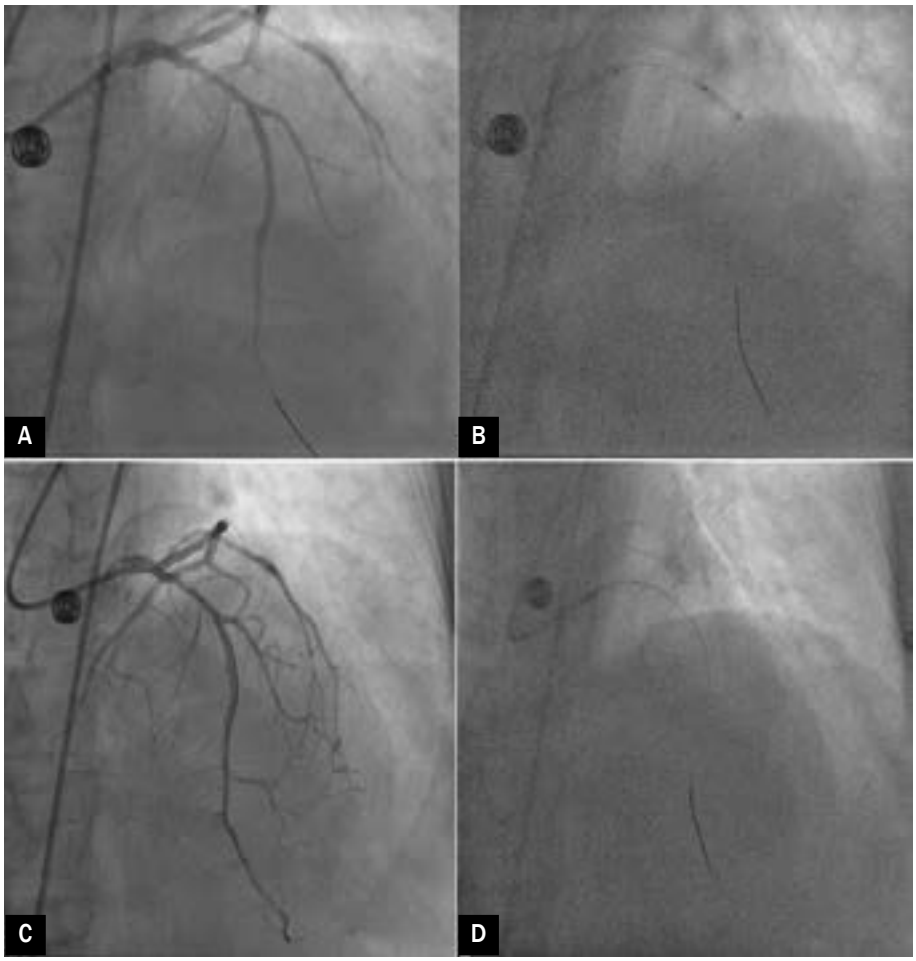

Figure 1A–D. Left anterior descending artery showing tortuous, calcified critical lesion in proximal part (**A**), predilation of the lesion with semi-compliant balloon (**B**), failure of stent getting delivered at the site (**C**), failure of stent getting delivered at the site with buddy wire (**D**)

leads. Echocardiography revealed mild concentric hypertrophy of left ventricle with ejection fraction of 62%. Her coronary angiography was performed after proper consent through transfemoral route, which revealed tortuous, calcified critical lesion in proximal left anterior descending artery (LAD) with other arteries being normal (Figure 1A). Subsequently, PCI was planned. Left system was hooked with extra back up (EBU) 6F (Medtronic, USA) and LAD was wired with 0.014", 140 cm runthrough guide wire (Terumo, Japan). The lesion was predilated with 2 × 10 mm, 2.5 × 10 mm and 3 × 10 mm Minitrak balloon-up to 20 atm pressure to prepare the bed (Figure 1B). We encountered little resistance while pushing the balloon. We tried to stent the lesion with 3 × 28 mm everolimus-eluting stent (Xience Prime; Abbott, USA), but failed on multiple attempts, as we could not track the stent to target lesion. We tried with buddy wire as well, but also failed (Figure 1C, D). We then introduced 5.6F GuideLiner (mother-in-child) over the runthrough guide wire and pushed its tip beyond the guiding catheter, but it failed to budge further across the lesion (Figure 2). We tried balloon assisted technique [5, 6], but because of razor effect, it also failed (Figure 3). We then pushed 2.5 × 10 mm balloon (Sapphire, OrbusNeich Netherland) little further from GuideLiner tip and inflated up to 3 atm pressure. Holding the balloon-wire assembly firmly, we advanced the GuideLiner by gently sliding over the inflated balloon, thus negotiating the tortuosity (Figure 4). The balloon was deflated and again pushed little ahead of the GuideLiner. Once again, we inflated the balloon at 3 atm pressure and the GuideLiner was advanced by gently sliding over the inflated balloon, thus successfully overcoming razor effect of its tip (Figure 5). Once its tip reached beyond the lesion, the balloon was removed and the stent was advanced beyond the lesion (Figure 6A, B). The GuideLiner was pulled back into the guiding catheter and the stent was positioned at the lesion by further pulling it up and deployed at 12 atm pressure (Figure 6C). It was further post dilated by Minitrak NC balloon (non-compliant) at 22 atm pressures, thereby achieving TIMI III flow (Figure 6D). The patient was discharged on the third day with acetylsalicylic acid — 150 mg/day, clopidogrel — 150 mg/ /day, atorvastatin — 80 mg/day, metoprolol — 100 mg/day

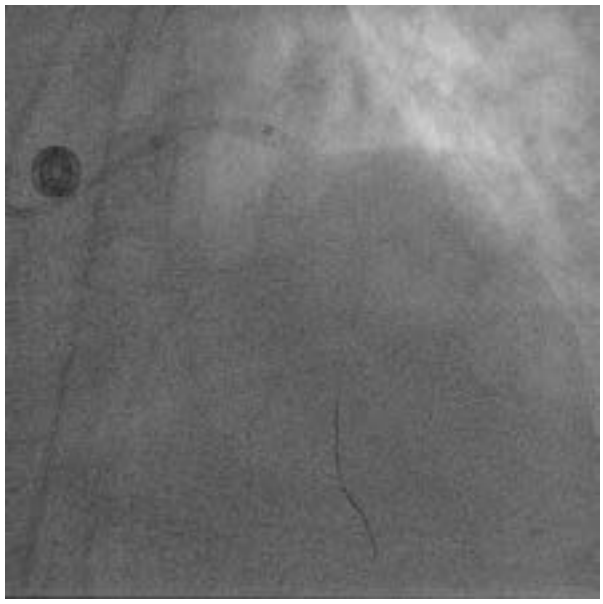

Figure 2. Failure of GuideLiner to budge across the lesion

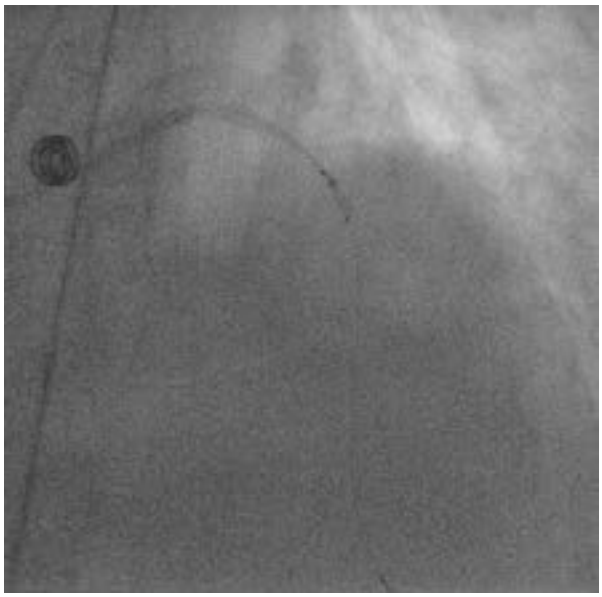

Figure 4. GuideLiner being advanced by gently sliding over the partially inflated balloon while holding the balloon-wire assembly firmly

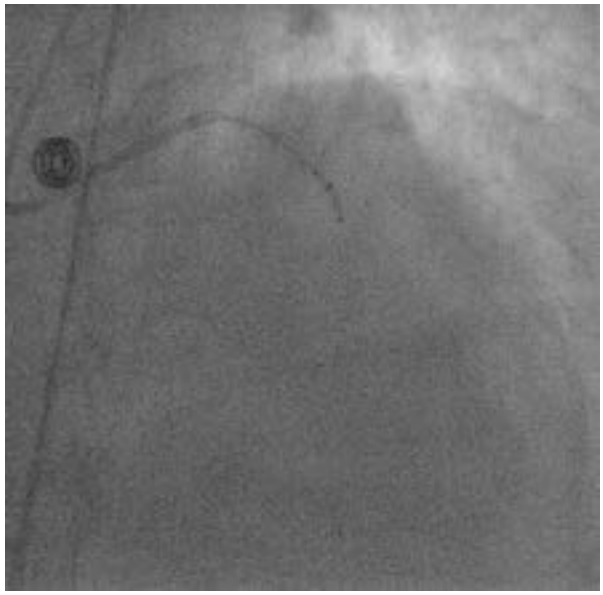

Figure 3. Failure of GuideLiner to budge further across the lesion despite balloon assisted technique

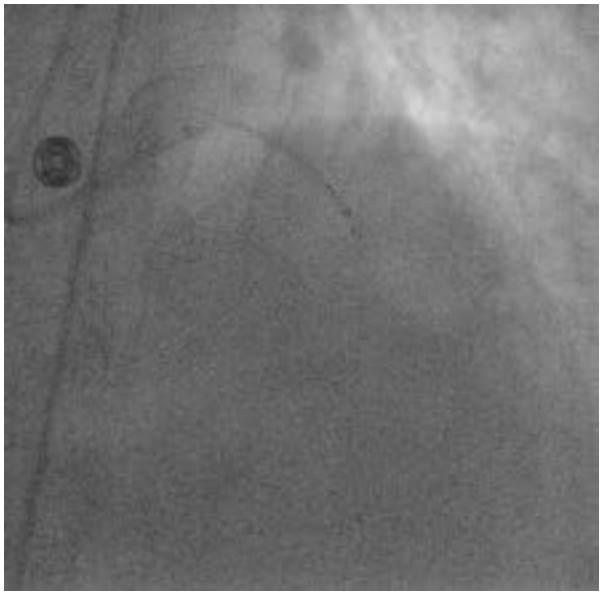

Figure 5. GuideLiner being further advanced by gently sliding over the partially inflated balloon while holding the balloon-wire assembly firmly

and ramipril — 5 mg/day. She is doing fine since then with regular follow-up at our institute.

Discussion

Several techniques are available to help delivering the stent in tortuous and calcified lesion, such as stable guide position by co-axial arrangement, deeper intubation of the guide catheter and the use of a buddy wire, stiffer guide wires, or anchoring balloons [5]. As a "mother and child" system, the GuideLiner enables deeper intubation and therefore provides better coaxial alignment and stability, actively supports and cuts the distance required to deliver stents by straightening the tortuosity. The more distal the GuideLiner is delivered, the easier the procedure becomes. Its movement can be facilitated by balloon anchoring distally, balloon assisted

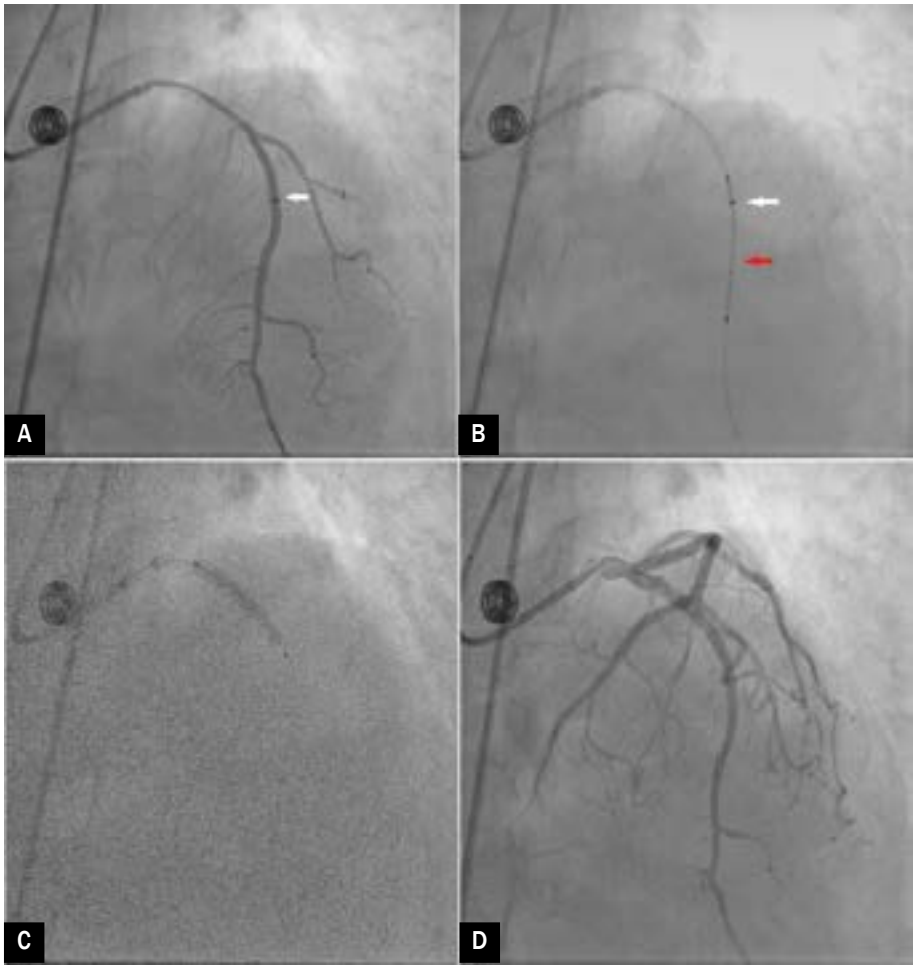

Figure 6A–D. GuideLiner reaching beyond the lesion (white arrow showing its tip: **A**), stent was advanced beyond the lesion (red arrow showing the stent: **B**), stent was positioned at the lesion by further pulling it up and pulling back the GuideLiner into the guiding catheter (**C**), successful percutaneous transluminal coronary angioplasty (PTCA) of target lesion showing TIMI III flow (**D**)

tracking and balloon assisted sliding and tracking. In balloon anchoring, a balloon is inflated in the target lesion and used as an anchor to facilitate distal delivery of the GuideLiner. This requires the ability to deliver the balloon to a diseased segment of vessel for inflation, provided there is no calcium and tortuosity. Also, inflating a balloon distal to the target lesion in normal vessel may cause local trauma, that might require stent extension, thus has a potential to increase a risk of in-stent restenosis. In balloon assisted tracking (BAT) technique [6, 7], the inflated balloon protrudes partially beyond GuideLiner catheter's tip and the whole assembly, *i.e.* GuideLiner-balloon moves over the wire. It prevents a "razor effect" of the GuideLiner edge with arterial wall, thus allowing easy navigation. This sometimes may not be successful if a vessel is calcified and tortuous.

BLAST-G technique is another modification of BAT technique. Here, low pressure inflation of balloon enhances the pushability and trackibility of GuideLiner, as total length of the catheter, which needs to cruise through the tortuosity, does not change. Compared to BAT, we advise smaller semi-compliant balloon (6–8 mm) to be used in BLAST-G to facilitate catheter movement. Potential problems with GuideLiner catheter are balloon damage at the site of metallic collar, damage of stents and it's dislodgement, pressure dampening, inadequate vessel opacification and air embolism. Therefore, it should be properly vented in order to diminish the risk of air embolism and the movement should be gentle. We have experienced success with BLAST technique to overcome 360° loop and bend to overcome complex radial artery tortuosity in transradial catheterisation [8], Therefore, BLAST-G technique is simple and effective approach to facilitate the advancement of the GuideLiner catheter through tortuous, heavily calcifield lesion and may be considered as a complementary technique to facilitate GuideLiner assisted PCI, in situations when anchor ballooning is not helpful or unfeasible, and BAT is unsuccessful.

Conflict of interest(s)

The authors declare no conflict of interest.

Streszczenie

GuideLiner (Vascular Solutions Inc., USA), GuideZila (Boston Scientific, USA) i Heartrail (Terumo, Japan) to cewniki prowadzące typu "mother in child" zapewniające mocne podparcie i tym samym ułatwiające wprowadzenie narzędzi przez kręte, zwapniałe naczynia. W przypadkach, kiedy nie można wprowadzić cewnika GuideLiner, nawet przy użyciu balonu kotwiczącego, autorzy wsuwają cewnik GuideLiner po napełnionym balonie półpodatnym (*semi-compliant*), używając średniego ciśnienia napełnienia balonu, co ułatwia jego wsuwanie po standardowym prowadniku przez kręte naczynia i stosowanie techniki balonu kotwiczącego. W niniejszym artykule opisano zastosowanie techniki zwanej *BaLloon Assisted Sliding and Tracking of GuideLiner* (BLAST-G) w celu skutecznego umieszczenia stentu w proksymalnym odcinku tętnicy przedniej zstępującej u 73-letniej chorej z przewlekłą stabilną chorobą niedokrwienną.

Słowa kluczowe: technika *sliding and tracking* z użyciem balonu, technika balonu kotwiczącego, zwapniała zmiana, cewnik GuideLiner

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