*Research Article*

# Assessment of optimum stent deployment: by using intravascular ultrasounds (IVUS).

**Nasser M. Taha\*, Khaled  S. Mahmoud\*, Tarek M. Abd Al Rahman\*,**
**Tarek M. Senosy\*, Rabin Chakraborty\*\*, Arindm Panda\*\*and Soumya Patra\*\*.**
\*  Department of Cardiology, Faculty of Medicine- Minia University Egypt and
\*\*Apollo Gleneagles Hospital, Heart Institute, Kolkata India.

## Abstract

**Background:** Inadequate stent expansion is an important cause of future complications   of percutaneous coronary intervention.  **Aim of the study:** was to evaluate value of IVUS in evaluation of stent deployment by using IVUS. **Patients and methods:**  We evaluated stent deployment in of 38 stents in 30 patients.  By using IVUS Based on those findings, We determined  IVUS criteria for adequate stent deployment as: minimal stent area more than 5.0 mm$^2$. If the reference vessel was less than 2.8 mm, adequate stent deployment was determined   as minimum stent area more than 4.5 mm$^2$. **Methods:** From June 2015 to June 2016, 30 patients (38 stents) were tested   using   IVUS. We compared between imaging techniques in minimal stent diameter, maximum stent diameter and mean stent diameter using Pearson correlation and Bland–Altman scatter plot. **Results**: There was good correlation between Stent Boost and IVUS measurements regarding minimal stent diameter ($p < 0.001$ in all stent portions) while lesser agreement was found between IVUS and QCA. **Conclusion:** We can use IVUS method for detection of stent insufficient deployment
**Key words:** Angiography, Cardiology, Intravascular ultrasound (IVUS), Percutaneous coronary intervention.

## Introduction

 One of the important   causes of stent thrombosis is insufficient stent deployment[1,2], this condition is often difficult to recognize from regular coronary angiograms. The only reliable method  to exclude insufficient stent deployment is intravascular ultrasound (IVUS)[3–6]. IVUS  is not used routinely in cardiac catheterization laboratories because it is expensive, time-consuming, and need trained  interventionalists in the interpretation of this technique[7].

## Aim of the study

Was to evaluate   value of  IVUS to detect insufficient stent deployment  after PCI.

## Patients and Methods

**1- Study design:** This prospective, single-center cohort study included 30 patients with known obstructive coronary artery disease who undergone PCI in Apollo Gleneagles  Hospital  Heart Institute Kolkata from June 2015 till June 2016.

## 2- Study population:

**Criteria of inclusion:**► Patients aged 18 years old and a clinical indication for stent implantation. **Criteria of exclusion:**► Refusal to participate in the study.► Implantation of a stent for in-stent restenosis**.**

IVUS measurements of the reference vessel and stented segment were made real time and were   available for procedural decision making **Data collection:** Clinical history, physical examination data, and data of a 12-lead ECG and Echocardiography (2D, M-mode, and Doppler) accessed from the study population as described above who gave consent for this study.

### Intravascular Ultrasound

IVUS was performed using a 2.5 French 40 MHz rotational catheter (Atlantis™ SR Pro; Boston Scientific, USA) with an automated pullback at 0.5 mm/s. IVUS was performed after stent implantation or post-dilation when necessary per study protocol.

## Statistical Analysis

Data was presented as mean values and standard deviations for continuous variables. Differences between QCA, IVUS, and StentBoost measurements were compared using the Pearson product–moment correlation and Bland–Altman analysis. All analyses were performed using SPSS.

## Results

This prospective, single-center cohort study included 30 patients with known obstructive coronary artery disease who did PCI in Apollo Gleneagles Hospital Heart Institute  Kolkata from one June 2015 till one June 2016. They included 27(90%) males and 3(10%) females with a mean age of 61.461.4±8.6 year (range 47-81).

**Table (1): Baseline characteristics of participant patients**
In-stent measurements by intravascular ultrasound (IVUS), quantitative angiography (QCA) and Stent Boost. (anova).

|  | QCA N=(38) | IVUS N=(38) | SB N=38) | P-value |
|---|---|---|---|---|
| **MSD** | 2.9±0.49 | 3.1±0.59 | 2.9±0.59 | 0.51 |
| **MXSD** | 3.9±0.71 | 4±0.76 | 3.8±0.77 | 0.56 |
| **Mean± SD** | 3.34±0.63 | 3.48±0.66 | 3.34±0.64 | 0.55 |

## IVUS Measurements

Intravascular ultrasound measurements were performed in all 38stents. The minimal stent diameter was $3.10 \pm 0.59$ mm, Minimal stent area was $7.70 \pm 2.90$ mm$^2$.

**Table (2):**

| Variable | Frequency N=(30) | Percentage N=(30) |
|---|---|---|
| **Age (years)** | 47_81 | 61.4±8.6 |
| **Sex** **Male** **Female** | 27 3 | 90 10 |
| **HTN** | 23 | 76.7 |
| **DM** | 20 | 66.7 |
| **Dyslipidemia** | 19 | 63.3 |
| **FH of premature CAD** | 5 | 16.7 |
| **Smoking** | 20 | 66.7 |
| **Post GABG** | 20 | 6.7 |
| **Previous PCI** | 5 | 16.7 |

## Discussion

The only reliable way to exclude insufficient stent deployment with certainty is IVUS [3-6]. However, in every daily practice, this technique is not used routinely because it is expensive, time-consuming, and can only be used by interventionalists who are specifically trained in the interpretation of this technique[7].IVUS can be used to demonstrate not only the MSA but also deformation of the stent, apposition of the stent struts against the vessel wall and dissection at the stent edge[10].Furthermore, the use of IVUS enables recognition of causes of early stent thrombosis such as

the presence of stent fracture, under expansion or inflow/outflow problems[11 - 13].

## Conclusion

We can encourage use IVUS   method for detection of  stent in sufficient deployment .

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