Immediate & Long Term Assessment of Coronary Stent Expansion Using Stent Boost Enhancement in Comparison to Intravascular Ultrasound

Thesis

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Contents

Abstract

Introduction : stent underexpansion is a major risk factor for in-stent restenosis and acute in-stent thrombosis . Intravascular ultrasound (IVUS) is the gold standard for detection of stent underexpansion. StentBoost (SB) is a recently developed technique that allows an improved angiographic visualization of the stent.

Aim of work : to compare stent expansion parameters by IVUS , SB enhancement and QCA and to evaluate the efficiency of SB guiding the stent postdilatation.

Methodology: from June 2013 to August 2014 ,33 stents (30 patients) were evaluated after eclective PCI using QCA , SB enhancement and IVUS .Optimization of stent deployment of inadequately expanded stents using balloon postdilatation was done then post dilatation reassessment using the previous 3 modalities.

Results *:the maximal SD measured by IVUS & SB was (3.45 ± 0.62 vs 3.55 ± 0.56 , p* 0.53 *) respectively with correlation (p <0.0001 & r 0.74). the minimal SD measured by IVUS & SB was (2.77 ± 0.53 vs 2.58 ± 0.56 , p* 0.*07) respectively with correlation(p <0.0001 & r 0.68).* The maximal SD measured by IVUS & QCA (3.45 ± 0.62 vs 2.97 ± 0.59, p 0.009) respectively with correlation (p <0.0001 & r 0.69). The minimal SD measured by IVUS & QCA (2.77 ± 0.53 vs1.88 ± 0.60, p 0.001) respectively with correlation (p <0.0001 & r 0.63). *The maximal SD measured by SB & QCA was (3.55 ± 0.56 vs 2.97 ± 0.59 , p* 0.001*) respectively with correlation (p <0.0001& r 0.61). The minimal SD measured by SB & QCA was (2.58 ± 0.56 vs 1.88 ± 0.60, p* 0.*001)respectively with correlation (p 0.003 & r 0.49). the postdilatation stent diameters obtained by QCA, SB and IVUS were significantly higher than poststenting diameters.*

Conclusion: StentBoost enhancement has superior correlations for stent expansion measured by IVUS when compared with QCA. SB enhancement improved stent visualization and identify stent underexpansion and can guide stent postdilatation .

Key words: Quantitative coronary angiography(QCA),Intravascular ultrasound(IVUS) , Stent Boost (SB)enhancement , stent diameter(SD).

جامعة القاهرة
كلية الطب
الدراسات العليا والبحوث

محضر

اجتماع لجنة الحكم على الرسالة المقدمة من

الطبيب / محمد حمدي عبد الوهاب لبيب

توطئة للحصول على درجة الماجستير / الدكتوراه

في طب الحالات الحرجة

تحت عنوان باللغة الإنجليزية : Immediate and long term assessment of Coronary stent expansion using Stent boost enhancement in Comparison to intravascular ultrasound.

باللغة العربية : مقارنة بين المؤثرات فوق الصوتية وتقنية تعزيز دعم الدعامة في تقييم تمدد الدعامات بالشرايين التاجية

بناء على موافقة الجامعة بتاريخ ٢٠ / ٥ / ٢٠١٥ تم تشكيل لجنة الفحص والمناقشة للرسالة المذكورة أعلاه على النحو التالي:-

١. أ.د/ حلمي حسن الغوابي — عن المشرفين

٢. أ.د. حسام قنديل — ممتحن داخلي

٣. أ.د. عادل محمد الأتربي — ممتحن خارجي

بعد فحص الرسالة بواسطة كل عضو منفردا وكتابة تقارير منفردة لكل منهم انعقدت اللجنة مجتمعة في يوم بتاريخ ١١ / ١١ / ٢٠١٥ بقسم الحالات الحرجة مدرج الوحدة الثامنة بكلية الطب – جامعة القاهرة وذلك لمناقشة الطالب في جلسة علنية في موضوع الرسالة والنتائج التي توصل إليها وكذلك الأسس العلمية التي قام عليها البحث ،

قرار اللجنة : قبلت الرسالة من حيث الشكل والمضمون واستعرض الباحث المراجع بطريقة مناسبة وأوصت اللجنة بقبول الرسالة وتوزيعها على الجامعات المصرية

توقيعات أعضاء اللجنة:-

المشرف الممتحن — الممتحن الداخلي — الممتحن الخارجي

عصام

List of Abbreviation

ACC	American College of Cardiology
ACS	Acute coronary syndrome
ACT	Activated clotting time
AHA	American Heart Association
AKI	Acute kidney injury
AMI	Acute myocardial infarction
BMS	Bare metal stent
CABG	Coronary Aretery Bypass Graft
CAD	Coronary artery disease
CRF	Chronic renal failure
CSA	Cross sectional area
CTO	Chronic total occlusion
Co Cr	Cobalt-Chromium
CX	Circumflex artery
DAPT	Dual antiplatelet therapy
DES	Drug eluting stent
DICOM	Digital Imaging and Communications in medicine
DSE	Digital Stent Enhancement
DM	Diabetes mellitus
DS	Diameter Stenosis

EEM	External Elastic Membrane
EF	Ejection Fraction
ESI	Enhanced Stent Image
FFR	Fractional Flow Reserve
FP	Flat Panel
FPS	Frame Per Second
HOME DES	Long-Term Health Outcome and Mortality Evaluation After Invasive Coronary Treatment Using Drug Eluting Stents with or without the IVUS Guidance) study
HTN	Systemic Hypertension
IHD	Ischemic heart disease
IVUS	Intravascular Ultrasound
LAD	Left anterior descending artery
LMWH	Low molecular weight heparin
MACE	Major Adverse Cardiac Events
Max SD	Maximal stent diameter
Mean SD	Mean stent diameter
MHZ	Megahertz
Min SD	Minimal stent diameter
MLD	Minimal luminal diameter
MPI	Myocardial perfusion imaging
MSA	Minimal stent area
OCT	Optical coherance tomography
PCI	Percutaneous coronary intervention

PES	Paclitaxel-eluting stents
PTCA	Percutaneous transluminal coronary angioplasty
PVD	Peripheral vascular disease
QCA	Quantitative coronary analysis
RCA	Right coronary artery
rpm	Revolutions per second
RVD	Referance vessel diameter
SB	Stentboost
SBS	Stentboost subtract
SDS	Summed defect score
SES	Sirolimus-eluting stents
SNR	Signal to noise ratio
SRS	Summed rest score
SSS	Summed stress score
ST	Stent thrombosis
STEMI	ST segment elevation myocardial infarction
SPECT	Single photon emission computed tomography
SVG	Saphenous vein graft
TASTE	Thrombus Aspiration in ST-Elevation Myocardial Infarction in Scandinavia
TVR	Target vessel revascularization
UFH	Unfractionated heparin

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