The First 11 Cases of the Unprotected Left Main Coronary Artery Stenting in Maharat Nakhon Ratchasima Hospital: Personal Experience.

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Abstract: Background: The medical treatment for unprotected left main coronary disease has poor outcome. Percutaneous coronary intervention (PCI) with stenting of the left main coronary artery is feasible in some selected cases. **Objectives:** This study was performed to evaluate the clinical result of left main coronary stenting in selected cases. **Method and result:** Eleven cases of symptomatic left main coronary artery disease were diagnosed and treated with stenting during June 2000 to August 2005. The procedure success rate was 100% and mortality rate was zero percent. There was only one patient having restenosis diagnosed on the third month of coronary angiographic protocol after PCI without any clinical symptom and revascularization was successful. No serious complication occurred. All patients have still survived with better quality of life. **Conclusion:** Stenting for unprotected left main coronary artery disease can be performed in the selected cases by experienced interventionist with very high success rate and no mortality rate. Further studies are needed to evaluate the role of drug eluting stent for the left main coronary artery stenosis.

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บทคัดย่อ : 11 รายแรกของการใส่สายสเต็นท์ในการถ่างขยายหลอดเลือดแดงและใส่ขดลวดของหลอดเลือดแดงที่ส่วนต้นของหลอดเลือดเลี้ยงหัวใจเส้นซ้าย: ประสบการณ์ส่วนตัว

พินิศจัย นาคพันธุ์, พ.บ.

ศูนย์โรคหัวใจ กลุ่มงานอายุรกรรม โรงพยาบาลมหาราชนครราชสีมา นครราชสีมา 30000

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ภูมิหลัง: โรคหลอดเลือดหัวใจตีบตันที่ต้นขั้วของหลอดเลือดแดงเลี้ยงหัวใจเส้นซ้าย ที่ได้รับการรักษาโดยทางยานั้นมักจะไม่ได้ผลดี แต่การขยายและใส่สเต็นท์ของหลอดเลือดตีบบริเวณนี้พบว่าสามารถที่จะทำได้และมีประโยชน์ในรายที่มีความเสี่ยงมากถ้าทำการผ่าตัดต่อเส้นเลือด **วัตถุประสงค์:** เป็นการรายงานผลทางคลินิกหลังจากผู้ป่วยได้รับการขยายหลอดเลือดและใส่ขดลวดที่ส่วนต้นของหลอดเลือดแดงเลี้ยงหัวใจเส้นซ้าย **วิธีการและผลการศึกษา:** จากผู้ป่วย 11 รายที่ได้รับการขยายหลอดเลือดและใส่ขดลวดที่ส่วนต้นของหลอดเลือดแดงเลี้ยงหัวใจเส้นซ้าย ในระหว่างปี ค.ศ. 2000-2005 ติดตามผลช่วง 6 เดือน ถึง 4 ปี พบว่าวิธีทำได้ผลสำเร็จร้อยละ 100 และมีอัตราของโรคแทรกซ้อนน้อย โดยไม่มีอัตราตายเลยทั้งก่อนและหลังทำบอลลูน ไม่มีผู้ป่วยที่ต้องทำซ้ำอีกในช่วงอยู่ในโรงพยาบาล ภาวะหัวใจเต้นผิดจังหวะเกิดขึ้นร้อยละ 18.18 ต้องขยายหลอดเลือดซ้ำในเวลาต่อมาร้อยละ 9.09 ผู้ป่วยส่วนใหญ่ได้รับขดลวดที่ไม่มียาเคลือบ มี 3 รายที่ได้รับสเต็นท์ที่มียาเคลือบ **สรุป:** การใส่สเต็นท์ที่ต้นขั้วของหลอดเลือดแดงเลี้ยงหัวใจเส้นซ้าย สามารถทำได้ในบางรายที่ได้คัดเลือกไว้ โดยเฉพาะในรายที่มีปัจจัยเสี่ยงสูงถ้าจะทำการผ่าตัด แต่ในปัจจุบันมีสเต็นท์ที่เคลือบด้วยยาทำให้ลดอัตราการอุดตัน ซึ่งควรจะต้องทำการวิจัยต่อไปว่าได้ผลดีกว่านี้หรือไม่ในช่วงติดตามผู้ป่วย

Introduction:

Left main coronary artery disease contributes 3-5% of all ischemic heart disease. Medical treatment is almost always unsatisfied[1,2]. In the past, the percutaneous balloon angioplasty at left main coronary lesion was very harmful and difficult. The accepted treatment was coronary artery bypass graft. Since the last decade, stenting has been gradually improved, the result of balloon angioplasty is better therefore new devices are widely used to overcome the difficulty to treat the unprotected left main coronary artery stenosis in some particular cases[3-6]. This study was performed to evaluate the clinical result of left main coronary stenting in selected cases.

Definition

Left main coronary artery is the origin of the left coronary artery; it is divided in to three portions, ostial, trunk and distal portions. Protected left main coronary artery was the artery with patent previous saphenous vein bypass graft or left internal mammary artery graft; unprotected left main coronary artery was the artery without the previous bypass graft[3]. Myocardial infarction was defined as prolonged chest pain with typical electrocardiographic changes and elevated cardiac enzymes, needed hospitalization; target lesion revascularization (TLR) was repeated percutaneous intervention in the same lesion.

Statistic

The main clinical study consisted of a outcome of left main coronary artery stenting, immediate result and long term follow up. Discrete variables were expressed as counts and percentages. Quantitative coronary angiography (QCA) analysis was performed in each coronary angiography using an on line QCA Toshiba system. The percentage of diameters was measured before and after the intervention.

Method

Cardiac center of Maharat Nakhorn Ratchasima Hospital performed successful left main coronary artery stent implantation for symptomatic stenosis greater than 50% narrowing from 2000 to 2005. The percutaneous coronary artery intervention of the left main coronary artery was considered when anatomy and lesion characteristic were suitable for stenting, with preference of the patient, or in surgical high risk. The patients were evaluated by joint meeting between cardiologist and cardiac surgeon. The lesion was underwent balloon predilatation or direct stenting technique was done according to operator's decision. The left main distal coronary artery lesion involving the left anterior descending or circumflex ostium was treated with kissing balloon, The stent was deployed to achieve the best final lumen diameter. The pre procedure medications were aspirin, clopidogrel, isosorbide, beta blocker and ACE inhibitor as needed. Routine heparin was given to maintain activated clotting time >300 second, GP IIB- IIIA antagonist was used in some selected cases. Aortic balloon pump was inserted in high risk group, such as triple vessels disease with severe right coronary artery disease, poor LV function or with heart failure history. The patients were observed in cardiac care unit one or two days after the procedure and transferred to be further observed in regular ward for 4 to 5 days. The patients were evaluated for immediate and long term results during follow up period. Follow up plan consisted of the first month visit and then every three months. And if the patients accepted CAG, it would be done at first three months visit. The cardiologist would be available if the patients had recurrence of chest discomfort, shortness of breath, fatigue or fainting spell.

Result

The characteristics of the 11 patients were described in table 1, the patient mean age was 59 years (range 48-72 years) male was predominant (54.5%). Hyperlipidemia (high cholesterol LDL and/or high

Table 1 Baseline clinical characteristics

	Cases N=11
Mean age (range) (years)	59 (48-72)
Male sex (%)	6 (54.5)
Family history (%)	0
Hypertension (%)	5 (45.5)
Hyperlipidemia (%)	10 (90.9)
Diabetes mellitus (%)	5 (45.5)
Smoking (%)	4 (36.4)
Prior myocardial infarction (%)	5 (45.5)
Unstable angina (%)	7 (63.6)
Prior congestive heart failure (%)	7 (63.6)
Cardiogenic shock (%)	1 (9.1)

triglyceride with low HDL) was frequently found in this group 90.9%. Diabetes mellitus and smoking were common and/or high. The presenting symptoms were unstable angina 63.6%, history of congestive heart failure 63.6%, previous myocardial infarction 45.5% and cardiogenic shock 9.1%.

Table 2 Baseline angiographic and PCI characteristics

Left main coronary artery location	
- Ostial	27.3% (3/11)
- Mid portion	27.3% (3/11)
- Distal portion	45.4% (5/11)
LV ejection fraction average(renge)	58.09%(35-78%)
Associated vessel	
- LAD	81.8% (9/11)
- RCA	54.5% (6/11)
- Circumflex	54.5% (6/11)
- One vessel	27.27%
- Two vessels	54.55%
- Three vessels	36.36%
Reference vessel diameter (left main)	Mean=3.63 mm. 3.5mm.=8 cases, 4.0 mm.=3 cases
- Diameter stenosis	50-95%, mean 70.9%
- Lesion length	5-13 mm., mean 9.1 mm.
- Stent diameter	3.5 mm.=8 cases, 4.0 mm.=3 cases
- Stent length	8-25 mm.
- G.P. IIB-IIIA Inhibitor	63.3% (6/11)
- Drug eluting stent	27.3% (3/11)

PCI = Percutaneous coronary intervention
LAD = Left anterior descending branch
RCA = Right coronary artery
LV = Left ventricle
G.P. = Glycoprotein

Baseline angiographic findings of left main coronary artery location were mid portion 27.3%, distal portion 45.4% and ostia portion 27.3%. Mean LV ejection fraction was 58.09%, diameter stenosis was range from 50 to 95%, the lesion length from 5-13 mm. intraluminal diameter ranged from 3.5-4.0 mm. Choice of stent diameter of 3.5 mm was 72.73% and that of 4.0 mm. was 27.27%. GP IIA-IIIB antagonist was used 63.3%. Drug eluting stent was used in small number 27.3%. (Table 2-3)

Table 3 Stent diameter deployed

Stent diameter	Cases (percentage)
3.5 mm.	8/11 (72.7)
4.0 mm.	3/11 (27.3)

Immediate result

The procedure success was 100%, no acute myocardial infarction occurred. Cardiac arrhythmia, eg. atrial fibrillation, premature ventricular contraction, ventricular fibrillation or ventricular tachycardia occurred 9.1% whereas congestive heart failure and renal failure were 0%. There was as complication that needed immediate coronary bypass graft. No acute closure, GI bleeding nor stroke happened among the immediate result.

During follow up

Follow up period ranged, median from 6 months to 4 years. No patient lost follow up. We were unable to repeat the coronary angiography in all patients due to financial problem and incorporative patients. TLR

Table 4 TLR- Target lesion revascularization

	Clinical outcome in hospital		During follow up	
	cases	Percentage	cases	percentage
Procedure success	11	100	-	-
Acute MI	0	0	0	0
Cardiac arrhythmia	1	9.09	2	18.18
Congestive heart failure	0	0	0	0
Renal failure	0	0	0	0
Referred to CAG	0	0	0	0
TLR	1	9.09	1	9.09
Acute closure	0	0	-	-
Cardiac death	0	0	0	0
GI bleeding	0	0	0	0
Stroke	0	0	0	0
Lost follow up	0	0	0	0

was 9.09% Table 4. Patient was referred for coronary artery bypass graft 0%, acute myocardial infarction occurred 0%. Congestive heart failure was 0%. Neither cardiac death, GI bleeding nor stroke occurred during the later follow up. Restenosis rate depends on the size of vessel and the pressure used. I used high pressure and short time during balloon dilatation or stent deployment. The antiplatelet medications, eg. aspirin and clopidogrel were routinely administered for 2-3 months. Control of serum lipid was also needed in this group.

The study comparing surgical and nonsurgical treatments of the left main coronary artery showed longer survival rate in former group. But in sub-group analysis of the patients with good left ventricular function and the left main coronary artery stenosis of 50-59%, there was no significant difference of survival rate between surgical and medical group.[8,11,13] The unprotected left main coronary artery PCI has been reported, the immediate success rate is high with relatively rare acute major cardiac events, especially in the patients who has good left ventricular function, EF of > 40% and normal right coronary artery.[6,10] In low risk group, the result gets better than in high risk group that has acute myocardial infarction or shock. The aortic balloon pump should be assisted in high risk group and glycoprotein IIB-IIIA blocker should be given if there is no contraindication[12]. Debulking of the left main coronary artery in high degree of stenosis or heavy calcification should be planned to reduce restenosis. Aggressive debulking with directional artherectomy before stenting may reduce the residual plaque burden and significant angiographic restenosis[9]. Kissing stent techniques have been reported as the useful methods to bailout the trouble of left main bifurcation. The restenosis may be reduced with using the drug eluting stent, and the result may be promising as compared with bypass graft.

Conclusion

These 11 patients were feasible for angioplasty. The high success rate and low mortality rate occurred presumably because of a good team work such as the available cardiovascular surgeon who stood by during the intervention procedure, good cardiac catheterization laboratory and cardiovascular care unit staffs.

Study limitation

In this hospital, there are 2 methods of treatment for left main coronary artery stenosis, bypass graft and percutaneous intervention. The outcomes of these 2 groups can not be compared because of incomplete follow up in the surgical group. The IVUS-guided procedure is not available due to expensive cost.

References

1. Cohen MV, Gorlin R. Main left coronary artery disease: clinical experience from 1964-1974. Circulation 1975; 52: 275-85.
2. Conley Ms, Ely RL, Kisslo J, Lee KL, Me Neer JF, Rosati RA. The prognostic spectrum of let main stenosis. Circulation 1978; 57: 947-52.
3. Ellis SG, Tamai H, Nabuyoshi M. Contemporary Percutaneous treatment of unprotected left main coronary stenosis. Initial results from a multicenter registry analysis 1994-1996. Circulation 1997; 96: 3867-72.
4. O' Keefe JH, Hartzler GO, Rutherford BD. Left main coronary angioplasty of 127 acute and elective procedure. Am J Cardiol 1989; 64: 114-47.
5. Tan WA, Tamai H, Park SJ. Long-tern clinical after unprotected left main trunk Percutaneous revascularization in 279 patients. Circulation 2001; 104: 1609-14.
6. Park SJ, Hong MK. Lee CW. Elective stenting of unprotected left main coronary artery stenosis: Effect of debulking before stenting and intravascular ultrasound guidance. J Am Coll cardiol 2001; 38: 1054-60.
7. Coy N, Rogers C, Kissing Sirolimus., Eluting stent for the treatment of left main coronary stenosis. Catheterization and cardiovascular interventions 2004; 61: 206-10.
8. Farinha JB, Kaplan MA, Haris CN, Dunne EF, Cartish RA, Kay JH. Disease of left main coronary artery: Surgical treatment and long term follow-up in 247 patients. Am J Cardiol 1978; 2: 124-8.
9. Kiemencij F, Serruy PW, Macaya C. Continued benefit of coronary stenting versus balloon angioplasty: five year clinical follow up of Benestent -1 trial. J Am Coll Cardiol 2001; 37: 1598-603.
10. Fajade Jean, Bossi J, Black AJ, Hayerizadeh BF. Unprotected left main stenting. The Paris course on revascularization 2000; 65-79.
11. Loop FD, Lyttee BW, Cosgrove DM. Atherosclerosis of left main coronary artery: 5 years result if surgical treatment. Am J Cardiol 1979; 44: 195-201.
12. Lopez JJ, Ho KKI, Stoler Re. Percateneous treatment of protected and unprotected left main coronary stenosis with new devices immediate angiographic results and intermediate term follow up. J Am Coll Cardiol 1997; 29: 345-52.
13. Caracciolo EA, Davis KB, Sopko. Comparison of surgical and medical group survival in patients with left main coronary artery disease: long term case experience. Circulation 1995; 901: 2325-34.
14. Colombo A, Gangloine A, nakamura S, Fienei L. "Kissing" stent for bifurcation coronary lesion. Cathet Cardiovase Diagn 1993; 30: 1598-603.