

Safety and Feasibility of Diagnostic Coronary Angiogram as Day Procedure

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FU ET AL.: Safety and Feasibility of Diagnostic Coronary Angiogram as Day Procedure. *With the miniaturization of diagnostic coronary catheters and meticulous post-procedural nursing care, puncture site complications are much reduced and patients can be mobilized earlier. Diagnostic coronary angiogram as a day procedure has been practiced worldwide. It can shorten hospital length of stay while improving patient satisfaction. During a pilot period of 6 months at Queen Elizabeth Hospital, Hong Kong, we showed that in selected patients, similar procedure could be performed safely and more cost-effectively. (J HK Coll Cardiol 2002;10:109-113)*

Coronary, cost-savings, day procedure, feasibility, safety

摘要

隨著診斷性冠狀動脈導管的微型化，穿刺部位的併發症已大大減少，病人早期進行活動。診斷性冠狀動脈造影作為日間程序已在世界範圍內得以實施。這可以縮短住院時間，同時提高病人的滿意程度。香港伊利沙伯醫院6個月的小規模研究表明類似的程序能夠安全的施行，並且有著更好的成本效益。

關鍵詞：冠狀動脈 節省資源 日間程序 可行性 安全性

Background

The concept of cardiac catheterization as outpatient is not new. Its safety has been confirmed in certain selected groups of patient.¹ The major advantages of cost savings and time conservation were attractive. The introduction of high-quality, smaller catheters has played an important role in the development of outpatient laboratory procedures nowadays.

To shorten hospital length of stay and to improve quality of care and patient satisfaction, increasing number of cardiac procedures is being done on day-

patient basis at Queen Elizabeth Hospital, Hong Kong. This study aims to assess the safety and feasibility of performing diagnostic coronary angiogram as day procedure.

Methods

A pilot study was carried out at the Cardiac Day Center of Queen Elizabeth Hospital, Hong Kong from July to December 2001.

It was known that vascular complications such as haemorrhage, haematoma and AV fistula formation, pseudoaneurysm and arterial thrombosis might occur following cardiac catheterization. The primary responsibility of the medical and nursing staff is to ensure proper patient selection and to prevent postoperative complications that might be dangerous and associated with patient discomfort. Therefore, special guidelines for selection of day-cath patients, nursing management for optimal care after cardiac

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catheterization were designed (Table 1).²

During this pilot study, patients undergoing diagnostic coronary angiogram, with a view to ad hoc angioplasty, done by 1-2 assigned operators were assessed for suitability as day procedure. They will be interviewed by CCU on-duty doctor on the day of preparation. The nurse of the day center would explain all the details of the day procedure and its after care to the patients and their relatives. All suitable day patients fulfilling the selection criteria and with none of the

exclusion criteria would be arranged as first or second cases on day of procedure. The operator of the procedure would decide after the angiogram whether the patients were suitable for day procedure or not.

The patients were recruited if they had normal or minor lesions, no active chest pain or symptoms of CHF, easily palpable femoral arteries with no evidence of peripheral vascular disease, adequate blood pressure control for hypertensive patients, adequate diabetic control for DM patients, independent activity of daily

Table 1. Nursing management

Immediately post-operative nursing management after cardiac catheterization

Back from cardiac catheterization lab at _____, BP _____, P _____.

Size of catheter used 4/5/6 Fr.

Total heparin used _____ units.

Circulation and pulse of the affected L/R, Limb/arm is normal/impaired/absent.

Wound oozing: Y/N

Haematoma: Y/N

Chest pain: Y/N

Dyspnoea: Y/N

The head of the bed is elevated to 30 degree / not elevated during bed rest and sand bag is applied: Y/N

Patient resumes diet at _____ and fluid intake is encouraged if no contraindication.

If complication is detected, Dr. _____ is informed at _____.

Rank and Name: _____

Ambulatory period

The patient is allowed to sit out and slowly mobilize after 4 hours of the procedure at _____, BP _____, and P _____.

Wound oozing: Y/N

Any complications: Y/N

Dr. _____ is informed at _____.

Advise on wound management and possible complications by _____.

Rank and Name: _____

Discharge

Patient is discharged at _____ (at least 6 hours after procedure) after checking the wound by Dr. _____.

Information sheet on "wound management and complication" is given to him/her.

The patient is discharged alone/accompanied by _____.

Rank and Name: _____

living, accompanied by family members or relatives after discharge, and home with lift to floor. Those patients were excluded if they had ad hoc angioplasty procedure done, significant coronary artery lesions requiring further treatment, active bleeding or known bleeding tendency, marked renal impairment with creatinine >200 $\mu\text{mol/L}$, obvious dehydration, were on warfarin, lived alone with poor social support, or lived far away from hospital.

Sheaths were removed right after the procedure by manual compression until haemostasis achieved. Then a sandbag would be applied over the groin wound for 2-4 hours. The patients started to ambulate 4 hours later³ and were discharged in 6 hours if wound haemostasis was adequately achieved. Written instructions detailing the wound care and backup medical support were given prior to discharge. They were advised to attend a follow-up session the next morning for wound inspection. Any complications were then recorded.

Results

Out of a total of 125 elective procedures done by the assigned operator during this period, 84 were excluded either because they had ad hoc angioplasty procedure done or did not meet the inclusion criteria. Of the 41 eligible patients, two requested to stay overnight because of personal reasons and one was admitted to ward when wound haemostasis could not be achieved after 8 hours. As a result, a total of 38 patients with normal angiogram or minor CAD were recruited. Twenty-one of them were males and 17 females. Their age ranged from 28 to 71 years (52.3, mean). All of them had stable angina with positive stress test. Four French sheaths were used in 32 patients, 5F in 4 and 6F in 2. No heparin was given during the procedure in 37 patients while 1000 units of heparin were given in one. No major complications were observed and no patients presented to the hospital again the night after the procedure. Clinical follow up was done the next day in all but two of the patients. Mild bruises were observed in 6 patients but with no haematoma, pseudo-aneurysm or AV fistula formation and no major bleeding requiring blood transfusion was seen. All patients were symptom free on subsequent follow up (Table 2). All patients expressed satisfaction

with early discharge without staying overnight in the hospital. There was no readmission related to the procedure.

Discussions

This pilot study shows that day-patient diagnostic coronary angiogram can be safely performed if we can identify certain patient subgroups with low risk characteristics. It is especially true with the availability of the new high-quality 4F catheters with bigger inner lumen. These give similar opacification and torquability compared to the 5F or 6F catheters (reported in an abstract form in the coming Tenth Annual Scientific Congress of the Hong Kong College of Cardiology) and it is easier to handle the puncture site wound.

In a number of cardiac centers overseas and locally, heparin is not routinely given during diagnostic catheterization procedures. In our cohort of patients, only one was given intra-arterial heparin injection deemed necessary by the operator. It was not given in 37 of the 38 patients, with no increase risk of thromboembolism. This also helps to achieve a better wound haemostasis after the procedure.

It is worth mentioning that meticulous nursing care with clear nursing management protocol is essential to ensure the safety of the day procedure and adequate haemostasis of the wound. Clear written instruction on how to handle subsequent wound complications and backup medical support greatly improves patient confidence and satisfaction.

In the study, all patients were requested to come back for wound inspection the next morning to document the possible wound complications. They were more willing to come back the next morning to staying in hospital overnight. Two patients did not attend the wound inspection session because of typhoon signal number 8 and heavy rain the subsequent day. Both of them were enquired through telephone. Provided with such a low risk of wound complications, we believe the next-morning-wound-inspection session is not mandatory in future full-scale service as long as the patients are given proper instructions of wound care and channels to report any suspicions.

With such a limited number of patients recruited in the study, a total of 66 days of hospitalization were saved (assuming each patient stayed in hospital for 1.5

Table 2. Characteristics, catheter size and incidence of post-cath. complication of 38 patients

| Case no. | Sex | Age | Reason for coro | Time to ambulate (hr) | Time to discharge (hr) | Size of catheter (Fr) | Unit of heparin | Complications | Remarks |
|----------|-----|-----|--------------------|-----------------------------|------------------------------|-----------------------------|--------------------|---------------|-----------------------------|
| 1 | M | 45 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 2 | M | 42 | +ve TMT | 4 | 6 | 4 | 0 | - | Typhoon No. 8 Heavy rain |
| 3 | F | 58 | +ve TMT | 4 | 6 | 4 | 0 | - | |
| 4 | M | 67 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 5 | M | 52 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 6 | F | 57 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 7 | F | 49 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 8 | F | 68 | +ve TMT | 4 | 6 | 5 | 1000 | - | - |
| 9 | F | 50 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 10 | F | 64 | +ve TMT | 4 | 6 | 4 | 0 | Mild bruise | - |
| 11 | M | 32 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 12 | F | 28 | +ve TMT | 4 | 6 | 4 | 0 | Mild bruise | - |
| 13 | F | 51 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 14 | M | 65 | Chest pain | 4 | 6 | 4 | 0 | - | - |
| 15 | M | 51 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 16 | M | 57 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 17 | F | 68 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 18 | M | 54 | +ve TMT | 4 | 6 | 5 | 0 | Mild bruise | - |
| 19 | M | 71 | +ve TMT | 4 | 6 | 5 | 0 | - | - |
| 20 | M | 43 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 21 | M | 61 | +ve TMT | 4 | 6 | 5 | 0 | - | - |
| 22 | F | 50 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 23 | F | 48 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 24 | F | 65 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 25 | M | 51 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 26 | M | 53 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 27 | M | 53 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 28 | M | 64 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 29 | M | 38 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 30 | F | 57 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 31 | F | 60 | +ve TMT | 4 | 6 | 6 | 0 | Mild bruise | - |
| 32 | F | 62 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 33 | F | 52 | +ve TMT | 4 | 6 | 4 | 0 | Mild bruise | - |
| 34 | M | 58 | +ve TMT | 4 | 6 | 6 | 0 | - | - |
| 35 | F | 53 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 36 | M | 62 | +ve TMT | 4 | 5 | 4 | 0 | Bruise | - |
| 37 | M | 53 | +ve TMT | 4 | 6 | 4 | 0 | - | - |
| 38 | M | 32 | +ve TMT | 4 | 6 | 4 | 0 | - | - |

days) while patient satisfaction was enhanced with early discharge. This translates into a significant amount of hospital cost savings.

With the demonstrated safety, feasibility, cost-effectiveness and better patient satisfaction, we are proposing full-scale implementation of day catheterization as a routine for diagnostic coronary angiogram and cardiac catheterization in properly selected group of patients.

Conclusion

Diagnostic coronary angiogram as day-procedure is safe, feasible and cost-effective in selected patients. The risks are minimal. Early ambulation is safe after

uncomplicated cardiac studies with 4-6F femoral arterial catheters in elective catheterization.

References

1. Clements SD Jr, Gatlin S. Outpatient cardiac catheterization: a report of 3,000 cases. *Clin Cardiol* 1991;14:477-80.
2. Juran NB, Rouse CL, Smith DD, et al. Nursing Interventions to decrease bleeding at the femoral access site after percutaneous coronary intervention. *SANDBAG Nursing Coordinations. Standards of Angioplasty Nursing Techniques to Diminish Bleeding Around the Groin. Am J Crit Care* 1999;8:303-13.
3. Steffenino G, Dellavalle A, Ribichini F, et al. Ambulation three hours after elective cardiac catheterization through the femoral artery. *Heart* 1996;75:477-80.