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Original article

Our experience of coronary angiography with and without heparin

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ABSTRACT

Aim: Coronary angiography is usually done with heparin. Our aim is to see whether it can be done without heparin through femoral route and its effect on local complications.
Method: We have studied 3780 patients from 2006 to 2010 using standard dose Heparin (5000 units), low dose heparin (2000 units) and no heparin. We have compared safety and complications in these three groups.
Results: Local complications were lowest in no heparin group. Blood transfusion requirements and surgical interventions were lowest in no heparin group. Thrombosis rate did not increase in no heparin group.
Conclusion: Coronary angiography can be done safely without heparin through femoral route.

1. Introduction

Coronary angiography is a relatively safe diagnostic procedure. It has major complications (death, stroke, myocardial infarction) of <.1%.[1] The procedure is usually performed in 30 min or less under local anaesthesia.

Systemic anticoagulation (heparin 3000–5000 units) is used commonly at the time of arterial sheath introduction. Groin complications rate vary between 1 and 14%. Groin complications include 1) local haematoma 2) pseudoaneurysm 3) retroperitoneal haemorrhage 4) AV fistula 5) thrombotic occlusion 6) infection 7) arterial laceration and perforation 8) dissection 9) femoral neuropathy.[2] Our aim is to see whether coronary angiography can be performed safely without heparin and its effect on local complications.

2. Materials and methods

We have studied 3780 patients. This was done from April 2006 to April 2010. All were in-patients. Angiography was done through femoral route. In the year 2006–2007 we had used 5000 units intravenous heparin. In 2007–2008 we used 2000 units heparin. We did not use heparin in 2008–2010. We have

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Table 1 – Complications.

Year	2006–2007	2007–2008	2008–2010	Chi-square (Pearson) value, df, p value
Heparin	5000	2000	No heparin	Chi-square = 33.359, df = 6, $p < .00$
Large haematoma	11	6	0	
Medium size haematoma	18	13	2	
Small size haematomas	30	21	10	
No haematoma	1161	1340	1168	
Total no. of procedures	1220	1380	1180	

compared local complications as well as safety issues throughout this period.

3. Statistical analysis

We have used chi-square test. Pearson modification was used in some cases.

4. Results and analysis

4.1. *Year 2006–2007*

We have used 5000 units heparin. In 60% cases heparin was given through arterial sheath and in 40% cases through intravenous route. One thousand two hundred and twenty two patients were studied. There were no catheter related thrombosis or distal arterial embolic obstruction. Four patients had AV fistula. Surgical intervention was required in two patients and two got cured following conservative treatment in two weeks.

Large haematomas (>5 cm diameter) were seen in 11 patients. Eight had significant drop in haemoglobin and required blood transfusion. Surgical intervention was required in four patients.

We have observed two retroperitoneal haematomas in this period. One patient responded to conservative treatment and one patient died. Pseudoaneurysm was seen in three patients and all required surgical intervention.

Medium size haematomas (2–5 cm diameter) were seen in 18 patients. Two patients had significant anaemia requiring blood transfusion and one needed surgical intervention.

Small size haematomas (<2 cm diameter) were seen in 30 patients. Blood transfusion or surgical intervention was not required in any of the cases. They responded to prolonged bed rest and limited mobilisation. Most of them took two weeks time to resolve.

4.2. *Year 2007–2008*

One thousand, three hundred and eighty patients were studied. We have used 2000 units heparin in this period. In 20% cases it was given through femoral sheath and in 80% cases by intravenous route. Catheter related thrombosis or distal embolic obstruction was seen in none of the patients. Two patients had AV fistula. Surgical intervention was required in one patient and one resolved with conservative treatment.

Large haematomas were seen in six patients. Blood transfusion and surgical intervention were required in four patients. Two of them required neither blood transfusion nor surgical intervention.

No retroperitoneal haematoma was seen in this period. One patient had pseudoaneurysm requiring surgical intervention.

Medium size haematomas were seen in 13 patients. Four of them required blood transfusion. None required surgical intervention.

Small haematomas were seen in 21 patients. Surgical intervention or blood transfusion were not required. They responded to prolonged bed rest with limited mobilisation.

In this period we had one patient developing acute inferior wall myocardial infarction during procedure and one had stroke.

4.3. *Year 2008–2010*

We have studied 1180 patients in this period. We have not used heparin during this time. None of the patients had catheter related thrombosis or distal arterial embolic obstruction.

We have not observed large haematoma, retroperitoneal haemorrhage, pseudoaneurysm formation in this period.

Medium size haematomas are seen in two patients. Surgical intervention and blood transfusion was required in one patient. Other responded to conservative treatment.

Table 2 – Complications.

Year	2006–2007	2007–2008	2008–2010	Chi-square (Pearson) value, df, p value
Pseudoaneurysm	3	0	0	Chi-square = 14.618, df = 6, $p < .023$
A V fistula	4	2	0	
Retroperitoneal haematoma	2	0	0	
No such complication	1211	1378	1180	
Total no. of procedure	1220	1380	1180	

Table 3 – Surgery and blood transfusion requirement.

Year	2006–2007	2007–2008	2008–2010	Chi-square (Pearson) value, df, *p* value
Surgery	8	4	none	8.203, 2,<.017
Blood transfusion	14	8	none	13.651, 2, <.001
Acute myocardial infarction	none	1	none	1.740, 2, <.419
Stroke	none	1	none	1.740, 2, <.419
Mortality	none	1	none	1.740, 2, <.419
Total no. of cases	1220	1380	1180	

Small haematomas are seen in ten patients. None of them required surgical intervention or blood transfusion. They responded to bed rest with limited mobilisation within one-week period. (Tables 1–4).

5. Discussion

Wang Yq et al first reported successful coronary angiography without heparin.[4] Mean operation time was 17.9 ± 11.3 min. Subcutaneous haematomas occurred in 1.8% cases and AV malformation in .07% cases. There was no myocardial infarction, stroke and peripheral arterial thrombotic events. In our series mean operation time was 11 ± 3 min in 2008–2010 and it was 15 ± 4 min in 2006–2008. 95% of our procedures was through right femoral route and 5% cases through left femoral route. At present 20% cases are through radial route and 80% through femoral route. We use intra-arterial heparin in all radial cases.

Male–female ratio is around 7:3. Diabetics constituted large part of our patient population (33%). 6% patients had impaired glucose tolerance. Local complications were reduced significantly in no heparin group. Even small and medium size haematoma resolution rate was faster in no heparin group. There was no incidence of stroke, catheter related thrombosis, acute myocardial infarction in no heparin group.

Interestingly we did not observe any peri procedure acute myocardial infarction in 2006–2007 (5000 units heparin) but one in 2007–2008 (2000 units heparin) which was treated by emergency angioplasty and stenting. During same period we saw one case of stroke during angiography. Possible explanation could be that low dose heparin may have increased PLTCD62 expression causing increased platelet aggregation. It has been studied earlier that if heparin concentration in blood is <.7 iu/ml, it increases platelet aggregation.[5] Local complication rate increases because of several factors like increased age, obesity, female, hypertention, high/low puncture, multiple punctures, short duration of pressure to achieve haemostasis.

Table 4 – Risk of coronary angiography.[3]

Mortality	.1%
Acute myocardial infarction	.05%
Cerebro vascular accident	.07%
Arrythmias	.38%
Vascular complication	.43%
Contrast reaction	.37%
Haemodynamic complication	.26%
Perforation of chambers	.03%
Others	.28%
Total complication	1.7%

6. Limitations of our study

It was not a randomised study. It was more of an observational study. In the no heparin group, all cases were done by experienced operators which was not so in first two heparin groups. In some of our cases (twelve) we had to give heparin because of increased procedure time for difficulty in engaging right coronary artery.

7. Conclusion

Our observation is that coronary angiography can be done safely without heparin through femoral route. Local complications can be reduced substantially by not using heparin.

Conflicts of interest

All authors have none to declare.

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