

Intraluminal Papaverine Injection in LIMA Pedicle: Does it improve LIMA flow?

Bagale Kailash K.¹, Kalyane Ravikumar Nagashetty², Seetharaman Rakesh³

Authors Affiliation

^{1,3}Assistant Professor ²Associate Professor, Department of CVTS, Sri Jayadeva Institute of Cardiovascular sciences and Research, Bengaluru, Karnataka 560069, India.

Corresponding Author:

Ravikumar Nagashetty Kalyane,
Associate Professor,
Department of CVTS,
Sri Jayadeva Institute of
Cardiovascular sciences and
research, Bengaluru, Karnataka
560069, India.
E-mail: ravicardiac@gmail.com

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Abstract

Aims: Effect of Intra luminal Papaverine injection on LIMA flow. *Methods and Material:* All the patients posted for CABG between January and July 2017, were included in this study. A total of 32 patients (26 male and 6 female) met the inclusion criteria and were subjected to this study. LIMA pedicle was disconnected distally and blood flow was timed for a minute, collected into a vessel and measured. A soft bulldog clamp was placed proximally and 10 ml of 0.6% Papaverine was injected intra-luminally and a second bulldog clamp was placed distally. After an indwelling time of 1 min, both the bulldog clamps were removed and flow measured for the next 60 seconds. Both flows were measured maintaining similar mean arterial pressures. *Results:* Mean blood flow before Papaverine injection was 27.18 ml. Mean blood flow after Papaverine injection was 60.81 ml. Mean difference in blood flow was 33.93 ml. *Conclusions:* Intraluminal injection of Papaverine to LIMA after dissection treats spasm effectively. Papaverine injection improves LIMA flow significantly and the difference in flow was found to be statistically significant

Keywords: LIMA; PAPAVERINE; CABG.

Introduction

Left internal mammary artery (LIMA) conduit is a corner stone of CABG. One of the deterrent factor is the vasospasm of the LIMA pedicle. Various methods and drugs have been used to decrease the incidence of vasospasm. Among them Papaverine used commonly which is a benzyloisoquinoline alkaloid which is a potent vasodilator though its direct action on smooth muscle. It is believed to inhibit cAMP and cGMP phosphodiesterases in smooth muscle thus increasing the cAMP and cGMP levels. It also additionally works by blocking calcium ions in the cell membrane and inhibits the release of calcium from the intracellular space. It also increases the angiographical vessel diameter.

Methods & Materials

This is a prospective observational study done in Sri Jayadeva institute of cardiovascular science and

research. Of all the patients posted for CABG between January and July 2017, were included in this study. A total of 32 patients met the inclusion criteria and were subjected to this study. We traditionally have used 1 ampule of papaverine that is 30 mg in 500 cc of normal saline and 10ml (.6%) intraluminally.

Inclusion Criteria

1. Patients undergoing off pump coronary artery bypass.

Exclusion Criteria

1. Injury to LIMA during harvesting.
2. Emergency CABG.
3. Patients requiring preoperative intra aortic balloon pump insertion.

Observations

Among 32 patients there were 26 male patient and 6 female patients, among which 50% were diabetics

and 40% were hypertensive and 13.5% Patients were both diabetic and hypertensive. Average EF was 48% & 68% patients had RWMA.

Procedure

LIMA pedicle was harvested using electrocautery.

LIMA pedicle was disconnected distally and blood flow was timed for a minute, collected into a vessel and measured. A soft bulldog clamp was placed proximally after injecting 10ml of 0.6% papaverine injected with 24 gauge IV cannula intraluminally and tip was clipped .

After an indwelling time of 1 min, the clip was removed and flow measured for the next 60 seconds.

Both flows were measured maintaining similar mean arterial pressures.

Results

- Mean blood flow before Papaverine injection was 27.18 ml
- Mean blood flow after Papaverine injection was 60.81 ml
- Mean difference in blood flow was 33.93 ml

Statistics

- Since p-value (0.000)<0.05, the test result is significant at 5% level of significance and we reject the null hypothesis (H₀).

Table 1: Paired samples statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1				
Before	27.1875	32	11.9608	2.1144
After	60.8125	32	16.2191	2.8672

Table 2: Paired samples correlations

	N	Correlation	Sig.
Pair			
Before & After	32	.266	.141

Table 3: Paired samples Test

	Mean	Std. Deviation	Paired Differences Std. Error Mean	95% Confidence interval of the Difference		t	DF	Sig. (2-tailed)
				Lower	Upper			
Pair 1								
Before & After	-33.6250	17.4018	3.0762	-39.8990	-27.3510	-10.931	31	.000

Discussion

Off pump coronary artery grafting is gaining popularity among CABG . LIMA is the preferred arterial conduit for grafting LAD. LIMA spasm is well recognized problem during its harvesting [1]. Subsequent maneuver of the heart depends on the stable hemodynamic.

Spasm free flow to LAD through LIMA becomes important during the procedure. To avoid this complication a spasmfree LIMA to LAD is required.

Intraluminal papaverine helps to avoid spasm & increase flow to LAD for successful outcome of opcab procedure.

Many surgeons use vasodilators either to prevent or to treat LIMA spasm, but best agent is not known [2,3,4,5,6,7].

Despite a lack of consensus on the best vasodilators papaverine is the most studied agent clinically.

Papaverine delivery to LIMA has ranged from topical application pedicled injection and intraluminal administration with or without hydrostatic dilatation.

Mills and Bringaze [5] found that LIMA flow to be the best after intraluminal injection of papaverine , the results of which are comparable to our study.

They prospectively compare intraluminal administration of papaverine to the topical application therapy.

LIMA flow after intraluminal administration was four times greater than the topical method.

Hausmann & coworkers [1] reported in more recent randomized study that LIMA flow was increased when papaverine was injected intraluminally.

Papaverine dilutes smooth muscle slowly, slower than NTG, but more quicker than calcium channel blockers [2,5,7]. Although the precessed time interval are not fully appreciated.

Dregelid and associates [8,9] have reported that increasing the concentration of topical papaverine from 0.8mg/ml - 1.5mg/ml did not increase the LIMA flow.

Papaverine dose in the literature have varied widely upto a maximum of 50mg [10] and concentration have ranged from 0.3mg- 1.5mg/ml.

Limitations of Study

- The size of the study is small
- Larger group size may have increased the statistical power of each group.
- Our patient population was not uniformly similar.

Conclusion

- Papaverine injection improves LIMA flow significantly and the difference in flow was found to be statistically significant ($p < 0.05$)
- Intraluminal injection of Papaverine to LIMA after dissection may be useful in treating spasm.

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