



A Comparative Study Of Oral Morphine As A Premedicant With Intramuscular Morphine In Patients Undergoing Open-Heart Surgery

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Abstract

Introduction: Morphine was used in the American civil war in 1869. In 1950. Opioid anesthesia came with the advent of cardiac surgery. However, because of incomplete suppression of stress response, hypotension, awareness during anesthesia and increased fluid and blood requirement, and the need to ventilate post-operatively limited its use. Opioid refers to drugs derived from opium both natural and synthetic. Narcotic refers to morphine and morphine-like analgesics.

Aim of the study: to compare oral morphine as a premedicant with intramuscular morphine in patients undergoing open-heart surgery.

Methods: this study was conducted at the government general hospital, madras medical college general between July 2020 and September 2021 at nizam's institute of medical sciences & hospital, Hyderabad panjagutta in the department of anesthesiology and critical care. after getting Institutional Ethical committee approval Written informed consent was obtained from all patients included in the study. 50 patients of ASA physical status I, II, and III undergoing cardiac surgery were included in the study. Group M – oral Morphine. Group I – Intramuscular morphine. All patients were assessed preoperatively using standard protocols and underwent preoperative evaluation. All patients received Premedication T.alprazolam using T.Ranitidine 150 mg P.O. the night before surgery and on the day of surgery 2 hours before operation P.O. with sips of water. All patients were explained preoperatively about the procedure and visual analog scale (Pain score) 10 cm scale so that it can be effectively used by the patient during the postoperative period.

Results: There were 14 males, and 11 females in group -m oral Morphine group and in Group I – Intramuscular morphine 15 males and 10 females, and it was not significant which has P-value of 0.7767. The time for 1st demand analgesia in the postoperative period in Group M is 13.8 hours and in Group-C 1.0 hours and statistically significant. (p=0.00079) The mean intraoperative systolic BP was 124 in m- oral Morphine group and 125 in Group I – Intramuscular morphine and was statistically not significant. Intra operative diastolic Blood pressure was compared between both groups had 80 and Group I – Intramuscular morphine 82 and P-value as 0.39 and not significant. The mean arterial pressure is not significant between both groups and group-M oral group had 94 ± 10.8 and in Group I – Intramuscular morphine 96 ± 12.6 and P-value 0.5527. But is significant at the 90th minute (P = 0.0262). Probably it is associated with the onset of action of Im morphine.

Intraoperative pulse rate in group –M was 90 ± 14 Vs 91 ± 16.9 in Group I – Intramuscular morphine and it is statistically not significant. Postoperative visual analog score in Group-M oral morphine group was 4.64 vs 5 in Group I – Intramuscular morphine. But it was highly significant at 2, 4, 8, 12, 20 Hours and. However, it was not significant at postoperative zero hours, 14, 16, or 24 hours. Intramuscular Morphine seems to have a certain lag in the onset of analgesia. The postoperative Ramsay sedation scale is 2.16 in Group-M, and 1.6 in Group I – Intramuscular morphine, This is statistically significant (P - 0.0156). The postoperative heart rate in group-M Vs Group I – Intramuscular morphine are 85 ± 12.7 and 101 ± 13.9 respectively and it is statistically significant (P=0.0002) during the postoperative period. The Postoperative changes in heart rate are significant at 2, 4, 8, and 24 hours after intramuscular Morphine injection. There was no statically significant difference in the complications between the 2 groups. However, Nausea & Vomiting was more in the IT Morphine group (11 vs. 9). Desaturation, Pruritis, bradycardia, and hypotension was also more in the morphine group. These findings may be clinically relevant although statistical analysis did not reveal any significant difference. **ConcLUision:** oral morphine produced better post-operative analgesia as shown by lower vas scores. oral morphine group demonstrated lesser amounts of analgesic and rescue analgesic requirements during the post-operative period. oral morphine group of patients has better sedation as shown by better scores on the Ramsay scale. all the side effects produced by morphine were easily manageable and did not contribute to an increase in mortality or morbidity.

Keywords: Oral Morphine, Intramuscular Morphine, Vas Score, Ram Say Scale, Cardiac Surgery

Introduction

Opioids have been used in the treatment of pain for thousands of years. The opioids contain 20 alkaloids. Opium means juice, from the Greek word. Morphine is the prototype drug and is named after the Greek God of dreams, Morpheous. Morphine was used in the American civil war in 1869. In 1950.[1] Opioid anesthesia came with the advent of cardiac surgery. However, because of incomplete suppression of stress response, hypotension, awareness during anesthesia and increased fluid and blood requirement, and the need to ventilate post-operatively limited its use. [2]Opioid refers to drugs derived from opium both natural and synthetic. Narcotic refers to morphine and morphine-like analgesics. Morphine can be used for spinal analgesia, Epidural analgesia as shown by Behar et al. Despite the high efficacy, it was not widely used because of the early reported high incidence of respiratory depression and somnolence. It was due to high doses, rather than the route of administration.[3]Gwirtz and associates recently reported high patient satisfaction and low incidence of side effects and complications of morphine in over 6000 patients.[4]Small doses of opioids administered to the central nervous system provide adequate analgesia, reducing the risks of intravenous analgesic administration, such as

respiratory depression, pruritus, nausea, and vomiting.[5] However, in the cardiac surgical population, regional anesthesia techniques are not routinely applied due to the scarcity of supporting studies and administration risks associated with preoperative systemic anticoagulation Low doses of oral morphine used to control postoperative pain have been shown to promote prolonged analgesia and have been associated with a lower risk of hematoma formation compared to the epidural technique [6]Therefore, this study has been undertaken to analyze the effect of intrathecal morphine as more cost-effective analgesia when compared to Multimodal analgesia.

Methods

This study was conducted at the government general hospital, madras medical college general between July 2020 and September 2021 at nizam's institute of medical sciences & hospital, Hyderabad panjagutta in the department of anesthesiology and critical care. after getting Institutional Ethical committee approval Written informed consent was obtained from all patients included in the study. 50 patients of ASA physical status I, II, and III undergoing cardiac surgery were included in the study. Group M – oral Morphine.Group I – Intramuscular morphine. All patients were assessed preoperatively using standard

protocols and underwent preoperative evaluation. All patients received Premedication T.alprazolam using T.Ranitidine 150 mg P.O. the night before surgery and on the day of surgery 2 hours before operation P.O. with sips of water. All patients were explained preoperatively about the procedure and visual analog scale (Pain score) 10 cm scale so that it can be effectively used by the patient during the postoperative period. Preservative-free Morphine sulfate comes in two strengths 15 mg/ml and 10 ml/ml ampoule manufactured by verve health care Ltd. We used 10 mg/ml of morphine sulphate (Vermor - 10). This was taken in a sterile 10 ml syringe mixed with sterile Normal saline by the incharge Anaesthesiologist uninvolved in the administration of Subarachnoid block or further conduct of the study. This solution was isobaric to cerebrospinal fluid. In the OT, patients were hooked on to monitors like E.C.G., pulse oximetry, and Non-invasive BP. After Baseline evaluation and recording of baseline data, Two 16G large IV cannula was started in both forearms. 500 ml of balanced salt

solution was administered as preload. The patient was turned to the right lateral position. The back was painted with an antiseptic solution and draped. All patients were catheterized by the operating surgeon to monitor urine output. Then vitals were recorded every 5 minutes until the end of surgery PR, BP, SPO2. IV fluids were given according to Bodyweight, blood loss, and 3rd space loss. Injection Diclofenac sodium 75 mg IV infusion was started after one hour of surgery for both groups. Fentanyl supplements of 20µg were used as and when necessary. At the end of surgery after replacing blood losses and fluids and after recovery from muscle relaxants by clinical assessment, the patient was reversed with inj. Neostigmine 0.05 mg/kg + Glycopyrrolate 10µg/Kg i.v. After thorough suctioning and good respiratory attempts patient was extubated on the table if hemodynamically stable. Recovery characteristics include VAS score; Ramsay sedation scale, Postoperative HR, and BP. Saturation, complications, and adverse effects of opioids were monitored and noted.

Table :1 Age distribution

Age Group	GROUP M- Oral Morphine Group		Group -I Intra Muscular	
	No	%	No	%
Up to 20 Yrs	1	4	1	4
21-30	5	20	7	28
31-40	6	24	6	24
41-50	7	28	5	20
51-60	3	12	5	20
Above 60 years	3	12	1	4
Total	25	100	25	100
Mean	41.0 Years		39.2 Years	
SD	13.8 Years		12.6 Years	
'p'	0.6835 Not Significant			

Table 2: Intra Operative systolic B.P.

Intra Operative Systolic	Group m- Oral Morphine	Group -I Intra Muscular		

B.P at minutes	Mean	S.D	Mean	S.D	p	Significance
Baseline	124	17.9	125.1	17.7	0.7729	Not Significant
15	123	16.4	122.4	14.8	0.7993	Not Significant
30	119	17.1	121.5	15.5	0.4504	Not Significant
45	123	16.1	119.2	15.1	0.4467	Not Significant
60	120	14.7	122.9	12.8	0.4115	Not Significant
75	120	14.0	121.4	14.4	0.9753	Not Significant
90	116	15.5	122.3	13	0.1206	Not Significant
105	117	9.7	121.9	13.7	0.3503	Not Significant
120	117	16.1	119.1	14.3	0.6378	Not Significant
135	118	12.5	121.0	14.4	0.4647	Not Significant
150	120	11.9	119.4	13.4	0.7943	Not Significant
165	117	12	118	14.1	0.7559	Not Significant
180	117	16	117.6	13.4	0.8157	Not Significant

TABLE:2 The mean intraoperative systolic BP was 124 in m- oral Morphine group and 125 in Group I – Intramuscular morphine and statistically not significant

Table 3: Intra Operative Diastolic B.P.

Intra Operative D.B.P. at minutes	Group m- Oral Morphine		Group -I Intra Muscular		p	Significance
	Mean	S.D	Mean	S.D		
Baseline	80.1	7.9	82.8	10.8	0.3901	Not Significant
15	80.2	10.0	81.3	12.1	0.7699	Not Significant
30	78.0	11.3	80.3	10.4	0.3404	Not Significant
45	77.8	9.9	79.5	12.6	0.4892	Not Significant
60	77.2	8.6	82.5	11.7	0.1019	Not Significant
75	76.8	9	82.0	9.7	0.1046	Not Significant
90	75.3	9.3	81.4	8.3	0.0114	Significant
105	76.4	8.1	79.3	9.3	0.3937	Not Significant
120	76.5	11.2	78.7	8.4	0.7631	Not Significant
135	79.2	7.5	80.4	9.4	0.5076	Not Significant
150	78	7.9	81.2	9.4	0.1445	Not Significant

165	76.7	7.4	78.6	9.6	0.3202	Not Significant
180	77.2	8.4	78.8	9.0	0.4659	Not Significant

TABLE :3 Intraoperative diastolic Blood pressure was compared between both groups had 80 and Group I – Intramuscular morphine 82 and P-value as 0.39 and not significant

Table 4: Intra Operative Mean Arterial B.P.

Intra Operative MAP at minutes	Group m- Oral Morphine		Group -I Intra Muscular		p	Significance
	Mean	S.D.	Mean	S.D.		
Baseline	94.6	10.2	96.9	12.6	0.5527	Not Significant
15	95.0	11.7	95	12.6	0.9923	Not Significant
30	92.3	12.9	94	11.3	0.3366	Not Significant
45	92.9	11.1	92.8	12.9	0.8842	Not Significant
60	92.4	9.7	96	11.1	0.1564	Not Significant
75	91.3	9.4	95.1	9.9	0.1679	Not Significant
90	89	10.3	95	9.1	0.0262	Significant
105	90	7.9	93.5	9.6	0.3035	Not Significant
120	90.1	12.2	92.2	9.4	0.5473	Not Significant
135	92.4	8.1	93.9	10.7	0.5409	Not Significant
150	92.2	8.2	93.9	10.2	0.4093	Not Significant
165	90.4	7.9	91.8	10.5	0.4847	Not Significant
180	90.5	9.8	91.8	9.8	0.8008	Not Significant

TABLE:4 The mean arterial pressure is not significant between both groups and the group-M oral group had 94 ± 10.8 and in Group I – Intramuscular morphine 96 ± 12.6 and P-value 0.5527. But is significant at the 90th minute (P = 0.0262). Probably it is associated with the onset of action of I'm morphine

Table 5: Intra Operative pulse Rate

Intra Operative PR at minutes	Intra Operative Pulse Rate				p	Significance
	Group m- Oral Morphine		Group -I Intra Muscular			
	Mean	S.D	Mean	S.D		
0	90	14.8	91.2	16.9	0.7924	Not Significant
15	91.5	17.0	91.3	19.1	0.5998	Not Significant
30	90.8	16.5	88.9	14.3	0.734	Not Significant

45	88	16.7	89.1	16.7	0.7634	Not Significant
60	88.2	17.3	87.4	19.3	0.7633	Not Significant
75	85.8	16.7	85.8	19.5	0.9227	Not Significant
90	85.1	18.2	83.3	17.2	0.969	Not Significant
105	83.5	20.3	81.1	17.3	0.8536	Not Significant
120	84	21.5	79.4	16.0	0.4374	Not Significant
135	86.8	21.7	78.3	16.4	0.1508	Not Significant
150	86.3	22.1	79.6	16.2	0.2989	Not Significant
165	86.6	22	80.1	16.2	0.3983	Not Significant
180	83.5	19.2	82.8	16.9	0.9768	Not Significant

TABLE:5 Intraoperative pulse rate in group –M was 90 ± 14 Vs 91 ± 16.9 in Group I – Intramuscular morphine and it is statistically not significant.

Table 6: Post Operative VAS

Post Op. Vas at hours	Group m- Oral Morphine		Group -I Intra Muscular		'p'	Significance
	Mean	SD	Mean	SD		
0 hours	4.64	1.41	5.0	1.41	0.3448	Not Significant
2 hours	4.64	1.41	5.24	0.88	0.0751	Not Significant
4 hours	3.76	0.88	4.6	0.76	0.0009	Significant
8 hours	3.8	0.76	4.4	0.76	0.0055	Significant
10 hours	3.8	0.71	3.92	0.49	0.2868	Not Significant
12 hours	3.6	0.58	4.04	0.61	0.0137	Significant
14 hours	3.72	0.54	3.76	0.66	0.9177	Not Significant
16 hours	3.84	0.47	3.96	0.45	0.3609	Not Significant
18 hours	3.84	0.47	3.88	0.53	0.8	Not Significant
20 hours	3.84	0.47	4.08	0.76	0.199	Not Significant

22 hours	3.88	0.44	4.4	0.65	0.0017	Significant
24 hours	3.92	0.49	3.84	0.55	0.5704	Not Significant

TABLE:6 Postoperative visual analog score in Group-M oral morphine group was 4.64 vs 5 in Group I – Intramuscular morphine. But it was highly significant at 2, 4, 8, 12, 20 Hours and. However, it was not significant at postoperative zero hours, 14, 16, or 24 hours. Intrathecal Morphine seems to have a certain lag in the onset of analgesia.

Table 7: Post Operative RSS

Post Op. RSS at hours	Group m- Oral Morphine		Group -I Intra Muscular		'p'	Significance
	Mean	SD	Mean	SD		
0	2.16	0.8	1.6	0.76	0.0156	Significant
2	2.32	0.47	1.56	0.65	0.0001	Significant
4	2.28	0.46	1.56	0.58	0.0001	Significant
6	2.32	0.48	1.68	0.56	0.0002	Significant
8	2.28	0.46	1.68	0.56	0.0003	Significant
10	2.24	0.52	1.88	0.44	0.0124	Significant
12	2.24	0.44	1.92	0.4	0.0113	Significant
14	2.24	0.44	2.0	0.29	0.0281	Significant
16	2.24	0.44	2.04	0.2	0.0437	Significant
18	2.32	0.48	2.04	0.2	0.0107	Significant
20	2.36	0.49	2.04	0.2	0.0051	Significant
22	2.32	0.48	2.04	0.2	0.0107	Significant
24	2.28	0.46	2.04	0.2	0.0219	Significant

Table:7 Postoperative Ramsay sedation scale is 2.16 in Group-M, 1.6 in Group I – Intramuscular morphine, This is statistically significant (P - 0.0156).

Table 8: Post Operative Heart Rate

Post Op. Heart rate at hours	Group m- Oral Morphine		Group -I Intra Muscular		'p'	Significance
	Mean	SD	Mean	SD		
0	85	12.7	101	13.9	0.0002	Significant

2	80	10.2	100	11.4	0.0001	Significant
4	76	9.8	99	12.2	0.0001	Significant
8	76	11.3	99	10	0.0001	Significant
12	79	11.5	99	11.3	0.0001	Significant
16	78	9.1	100	10.1	0.0001	Significant
20	78	8.2	100	9.6	0.0001	Significant
24	77	8.5	102	8.8	0.0001	Significant

Table:8 The postoperative heart rate in group-M Vs Group-I -I Intra Muscular are 85 ± 12.7 and 101 ± 13.9 respectively and it is statistically significant ($P=0.0002$) during the postoperative period. The Postoperative changes in heart rate are significant at 2, 4, 8, and 24 hours after Oral Morphine injection. There was no statically significant difference in the complications between the 2 groups. However, Nausea & Vomiting was more in the oral Morphine group (11 vs. 9). Desaturation, Pruritis, bradycardia, and hypotension were also more in both the morphine group. These findings may be clinically relevant although statistical analysis did not reveal any significant difference.

Discussion

Morphine is worldwide the analgesic of the first choice after cardiac surgery in children. Morphine has unwanted hemodynamic and respiratory side effects. [7]Therefore, post-cardiac surgery patients may potentially benefit from a non-opioid drug for pain relief. Hemodynamic parameters including SBP, DBP, MAP, HR and SaO2 were compared both in the intra-operative period and post-operative period. Intraoperatively there was no difference between the groups. Post-operatively oral Morphine group demonstrated significantly stabler Hemodynamics.[8] This may be related to the more superior and stable pain control that was achieved in this group. Dahl JB et al in their study using 0.2 mg of preservative-free morphine 0.2 mg to 2.2 ml of hyperbaric bupivacaine 2.2 ml in patients undergoing hip surgeries demonstrated no alterations in Hemodynamics both in the intra-operative and post-operative period. This asserted the hemodynamic stability of intrathecally used morphine. The findings in our study agree with these conclusions. Nausea & Vomiting was more in the oral Morphine when compared to the intramuscular morphine group (11 vs. 9). [9]Desaturation, Pruritis, bradycardia, and hypotension was also more in the morphine group. These findings may be clinically relevant although statistical analysis did not reveal any significant difference. [10] Flacke JWet.al reported respiratory

depression following spinal morphine. In our study, we had 2 patients with hypoventilation and 1 patient who developed desaturation but they were easily manageable by oxygen supplementation.[11] Fowler FJ Jr *et al* reported adverse reactions such as pruritus and urinary retention after intrathecal administration of opioids. Our study recorded Pruritis in patients but urinary retention could not be assessed since all patients continued to have their bladders catheterized during the study period. [12] Gottschalk A *et al* studied the effect of a low dose (4- 5g/kg) of intrathecal morphine and found the incidence of Nausea or vomiting, pruritis, and urinary retention was 32%, 37%, and 6% respectively. The findings in our study are in concurrence with these studies.[13,14,15]

Conclusion

oral morphine produced better post-operative analgesia as shown by lower vas scores. oral morphine group demonstrated lesser amounts of analgesic and rescue analgesic requirements during the post-operative period. oral morphine group of patients has better sedation as shown by better scores on the Ramsay scale. all the side effects produced by morphine were easily manageable and did not contribute to an increase in mortality or morbidity.

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