

Olanzapine

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(Clores, 2016)

Introduction

Queensland Ambulance Service (‘QAS’) paramedics are subjected to occupational violence from agitated patients.

Due to the frequency of interactions with these types of patients, and the threat posed to safety, the ability to deescalate the threat, and for the purpose of being able to provide treatment to the patients underlying conditions, the use of chemical restraints is an important issue (Dick, 2016; Weiss et al., 2012).

Currently, the QAS drug therapy protocol (‘DTP’) provides two antipsychotic drugs, namely droperidol and haloperidol, which are administer by the intramuscular route, for the chemical restrain of agitated patients (Queensland Ambulance Service, 2015, 2016b). The QAS DTP does not provide for the administration of antipsychotic drugs via the oral route (Queensland Ambulance Service, 2016a).

Olanzapine, a Therapeutic Goods Administration approved drug, which is currently not included in the QAS DTP, is an atypical antimanic, antipsychotic and mood stablising agent which can be administered by the oral route by way of orally disintegrating tablets (Commonwealth of Australia, 2016; MIMS Australia, 2016; Queensland Ambulance Service, 2016a).

Research

Investigations were undertaken to ascertain clinical studies, retrospective reviews and literature reviews in relation:

- the use of orally disintegrating olanzapine (‘ODO’) in either the prehospital or emergency department environment; and
- the efficacy of ODO compared to other antipsychotic drugs.

The clinical studies, retrospective reviews and literature reviews were carefully considered for the purpose of considering whether it was appropriate that ODO be recommended for inclusion in the QAS DTP.

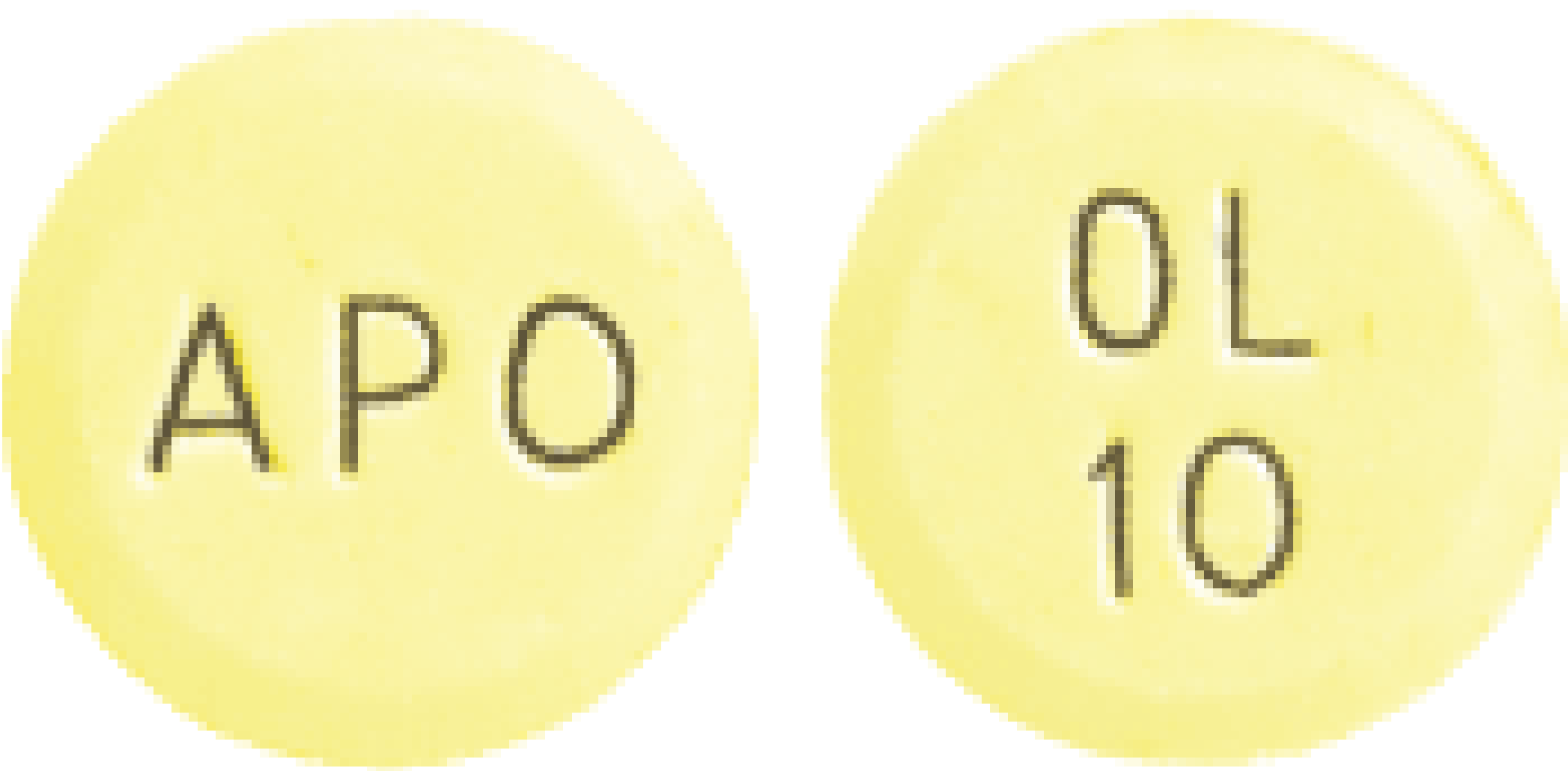


Figure 1: Presentation of ODO (MIMS Australia, 2016)

Discussion

The aims of treatment of patients with acute agitation are: to calm the patient without over sedation, reduce the aggressive and violent behavior of the patient and allow for the treatment of the patient's underlying medical conditions (Wilson, MacDonald, Vilke, & Feifel, 2012). In relation to the administration of drugs to agitated patients, Villari et al. (2008) found that oral medications, including ODO, should be preferred to IM or IV routes as it is considered to be less coercive and abusive by the patient. Given the aims and findings, it is important that QAS paramedics are able to appropriately chemically restrain agitated patients. As such, it would be appropriate that the QAS DTP included a drug, such as ODO, that could be administered via the oral route.

Benefits of ODO

- Safety –
 - Alleviate the risk of needle stick injuries (Gault et al. 2012).
 - Predetermined dosages would alleviate the risk of drug calculation errors occurring (Soerensen et al., 2013)
- Over sedation –
 - ODO is less likely to result in over sedation than haloperidol and droperidol, (Bryant & Knights, 2015; Currier, 2000; Michael P. Wilson et al., 2012).
- Efficacy
 - ODO has greater efficacy and fewer side effects than haloperidol in acute agitation in patients with dementia, schizophrenia and bipolar and is effective in patients suffering methamphetamine psychosis (Battaglia, 2005; Mclver et al. 2006).
- Adverse reactions –
 - ODO is less likely to cause adverse reactions, such as extrapyramidal effects and respiratory depression, which are more often seen in the use of haloperidol and droperidol (Bryant & Knights, 2015; Michael P. Wilson et al., 2012).

Limitations of ODO

- Non-compliant patients limit the ability for paramedics to administer ODO (Montgomery et al., 2012; San, Casillas, Ciudad, & Gilaberte, 2008).

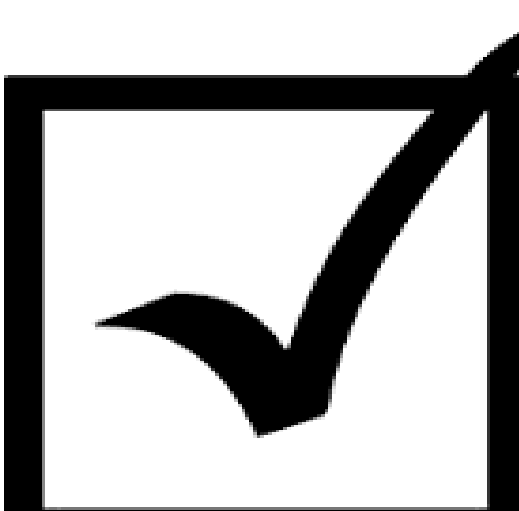
Implications of inclusion of ODO in the QAS DTP

- ODO should compliment existing antipsychotic drugs in QAS DTP as it provides a first in line treatment, and a subsequent availability to a stepped approach to treatment, and provides an alternative route of administration (Area Clinical Director Mental Health, 2010; Baker, 2012; Gault et al., 2012; Queensland Ambulance Service, 2015, 2016b; Michael P. Wilson et al., 2012; Wood, 2010; Zeller & Rhoades, 2010).
- Costs associated to the introduction of ODO would be limited and likely only be associated with the development of the DTP, purchase of the drug and training paramedics on the use of the drug.

Conclusion

Is recommended that ODO be included in the QAS DTP, so as to align with the aims of treatment of agitated patients, patients views in relations to the administrations of drugs and, importantly, to assist in reducing the threat posed to paramedic safety by agitated patients.

Proposed DTP (abridged)

	Indications <ul style="list-style-type: none">Acute behavioral disturbance (Montgomery, Treuer, Karagianis, Ascher-Svanum, & Harrison, 2012)
	Contraindications <ul style="list-style-type: none">Hypersentitivity to olanzapineDementia related psychosisParkinsonsPatients <16 yearsLactating patients (MIMS Australia, 2016)

Adult Dosages		
ACP CCP	PO	16 years to 65 years – 10mg (Hsu et al., 2010; MIMS Australia, 2016)
Pediatric Dosages		
ACP CCP	PO	13 years to 15 years – 10mg (MIMS Australia, 2016)
Note: QAS paramedics are not authorised to administer olanzapine to pediatric patients <13 (MIMS Australia, 2016).		

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Intravenous paracetamol as a prehospital alternative to opioids for acute pain

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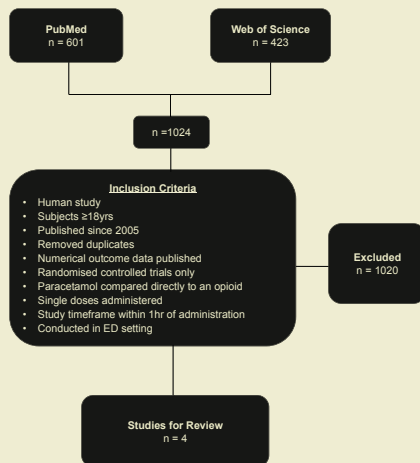
BACKGROUND

- Severe, acute pain in the prehospital setting is often managed with narcotics, however there are some limitations with regard to their use. Opioids are associated with hypotension, respiratory depression and sedation^{1,9}, there are often service restrictions on total administrable doses, opioid allergies may be present, and some patients may have pain despite narcotic administration.
- Intravenous paracetamol (IVP) has been suggested as a possible alternative to opioids. IVP is already used in the perioperative setting and in some prehospital services, including the London Ambulance Service.⁶ Several studies have demonstrated its efficacy compared to placebo.^{1,4,7,9}
- The prospect of an opioid-alternative for treating pain in the prehospital setting is appealing, however the efficacy of IVP compared to traditional narcotics must first be established.

RESEARCH QUESTION

How effective is intravenous paracetamol compared with intravenous opioids in treating acute pain?

FIGURE 1 – Primary Outcome Literature Search



METHODS

A search strategy was developed using key words from the research question. PubMed and Web of Science were both searched, producing 1024 articles. Inclusion criteria were then applied (Figure 1), producing 4 double-blind, randomised controlled trials for review. Specific restrictions included ED settings, acute pain, single dose administration only, IVP being compared directly to an opioid and multiple outcome data recorded in the first hour of presentation as opposed to more spaced out intervals over 24 hours. This was done to emulate parameters of the prehospital setting. All studies had sample sizes large enough to detect statistically significant results.

MAIN RESULTS

BEKTAS et al. 2009:

- Compared 1g IVP single dose with 0.1mg/kg intravenous morphine (IVM) single dose in patients presenting with suspected renal colic.²
- Patients were recruited after diagnosis of suspected renal colic with a pain rating of ≥20mm on a 100mm visual analogue scale (VAS).²
- Exclusion criteria included drug allergies, use of any analgesia within six hours of presentation, haemodynamic compromise, fever, pregnancy, evidence of other pathology and significant comorbidities.²
- No significant difference between IVP and morphine in reducing pain at 15 or 30 minutes after administration (Figure 2a), P=0.74.²**

CRAIG et al. 2012:

- Compared 1g IVP single dose with 10mg IVM 15 minute infusion in patients with acute traumatic limb pain.³
- Subjects were recruited after identification of isolated limb trauma and at least 7/10 pain.³
- Exclusion criteria included drug allergies, ALOC, chest pain or major trauma, pregnancy, communication difficulties, extreme distress or patients that required an immediate procedure to save the limb.³

FIGURE 2 – VAS reduction between paracetamol and morphine over 30 minutes

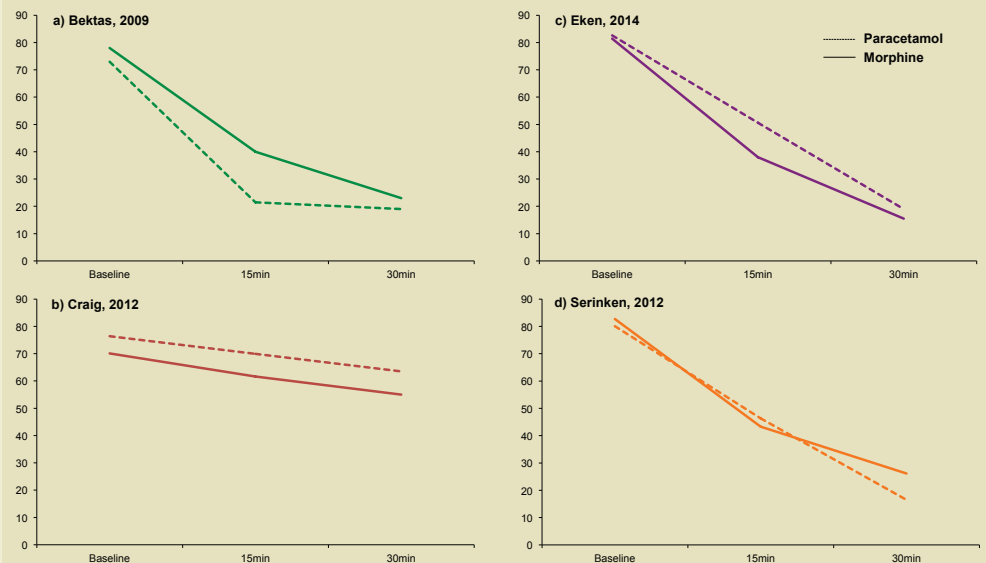


Figure 2: Changes in VAS score over the study period. a) no overall difference in pain reduction between groups, although IVP was more effective at 15 min² b) no difference between groups, however 30 min VAS scores were much higher than in other studies³ c) no significant difference between treatment groups at any point⁵ d) no significant difference between treatment groups at any point⁸

- VAS was recorded every 15 minutes for one hour. **No statistical difference was found in pain reduction between groups (Figure 2b), P=0.28.³**

EKEN et al. 2014:

- Compared 1g IVP single dose with 0.1mg/kg IVM single dose in patients with acute, mechanical lower back pain.⁵
- Patients all had an initial pain score of moderate or severe on a four-point verbal rating scale.⁵
- Exclusion criteria included analgesia within 6 hours of presentation, pregnancy, severe comorbidities or other pathology, haemodynamic instability, sciatalgia, neurological deficits and drug allergy.⁵
- No significant difference was found in overall pain reduction between groups (Figure 2c)⁵, no P-value reported.**

SERINKEN et al. 2012:

- Compared 1g IVP single dose with 0.1mg/kg IVM bolus dose in patients with suspected renal colic.⁸
- Patients had an initial pain score of moderate or severe on a four point verbal rating scale.⁸
- Exclusion criteria included analgesia within 6 hours of presentation, significant comorbidities, peritoneal irritation, drug allergy, pregnancy and patients who's final diagnosis was not renal colic.⁸
- There was no significant difference in pain reduction between groups (Figure 2d)⁸, no P-value reported.**

TABLE 1 – Rescue analgesia and adverse effects

	Bektas, 2009		Craig, 2012		Eken, 2014		Serinken, 2012	
	P	M	P	M	P	M	P	M
Rescue analgesia (%)	46.0	49.0	29.6	28.6	17.4	15.8	15.8	20.0
	NS	NS	NS	NS	NS	NS	NS	NS
AE (%)	24.0	33.0	7.4	28.6	8.7	15.5	5.3	14.3
	NS	NS	P=0.03	P=0.03	NS	NS	NS	NS

Table 1 - No study found a difference in rescue analgesia required between groups. One study found that there were significantly fewer adverse effects in the IVP group compared to IVM.³

SECONDARY OUTCOMES

RESCUE ANALGESIA REQUIREMENTS:

- The amount and frequency at which rescue analgesia was used was not significantly different between groups. This was seen across all studies (Table 1)^{2,3,5,8}**
- Two studies removed some subjects from analysis as they required rescue analgesia before the study period had ended. This may cloud the true results.^{2,8}

ADVERSE EFFECTS:

- Craig et al found that adverse effects were fewer in the IVP group (Table 1). All other studies found no differences.³**
- Data may have been affected by the fact that pathologies such as renal colic may independently cause nausea and vomiting.

LIMITATIONS & CONSIDERATIONS

- Only three pain pathologies were assessed across the four studies → this may limit applicability of the results to all patient populations.
- It is unclear if the trends observed in this review would continue past the 30 minute study period into the medium term.
- Despite all being double-blind RCTs, all studies were single-centre only → this puts some limitation on generalisability of results.
- Overall pain reduction was not as great in the study by Craig (Figure 2b) compared to other studies.³ This may be due to traumatic limb pain being more resistant to analgesia, however there is insufficient information to assess this.

CONCLUSIONS

- Current evidence suggests that **intravenous paracetamol might be as effective as morphine in reducing acute pain.**
- Intravenous paracetamol may be associated with less adverse effects than morphine.
- A multi-centre study comparing IVP, IVM and intravenous fentanyl across multiple pain pathologies is required to broaden the applicability of these results. This should include an intention-to-treat analysis including patients who require premature rescue analgesia – this will assist in assessing the true efficacy of IVP.
- Intravenous paracetamol may be a feasible alternative to opioids for providing analgesia to certain patients in the prehospital setting, particularly those with opioid allergies, susceptibility to opioid side effects or where opioids aren't providing adequate analgesia.**

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AMETHOCAINE.

This proposal was prepared to recommend Australian ambulance services to incorporate the ocular local anaesthetic drug **amethocaine** (*aka tetracaine*) into the current list of emergency drug therapy protocols (DTPs).

Quality research was performed in order to assess how safe and effective this pharmaceutical is, and why it would be beneficial on road for paramedics to administer within the prehospital environment. Five articles were found and reviewed on current hospitals/practitioners using this product. All of which, report low-risk side effects accompanied with a successful way of locally anesthetizing the eye and providing analgesia for patient comfort. It was found that rural nurses and Drs. within Australia are exclusively using amethocaine eye drop in emergency situations, indicated for corneal foreign bodies/abrasions and chemical exposure. According to the latest data, eye injuries are within 10 per cent of emergency room presentations overall. This review has concluded that there are more benefits outweighing the drawbacks of adding amethocaine to the DTPs; including promoting patient comfort by using a less invasive analgesic technique and directly locally anesthetizing the area, creating less chance of further damaging the eye.

Considering pain-management and further injury prevention are fundamental services provided by paramedics in the prehospital setting, it is beneficial for Australian ambulance services to consistently expand and improve DTPs with the ever-evolving medical environment and pharmaceutical products.

Through previous and current research, evidence continues to prove amethocaine a safe and effective ocular local anaesthetic for short-term use. Overall, it would be an inexpensive yet useful drug for paramedics to carry on board ambulances within Australia.

PMSC13003
Pharmacology in Paramedic Practice

Assessment 2
Presentation & Written Assessment

**AMETHOCAINE
(Aka Tetracaine)**

2016

Emma Dale (S0244270)

INTRODUCTION

The aim of this report is to recommend all Australian ambulance services consider adding amethocaine eye drops to the current list of emergency medicine DTPs. This quality research aims to improve emergency medicine, offering the latest pharmaceuticals, therefore enabling paramedics to deliver the best possible patient care.

According to Queensland Government data (2015), eye injuries (including burns) are the seventh most common overall leading injury presented within the emergency department, followed by foreign body in the eye listed as eighth, making eye-related injuries 10% of all emergency presentations. The cornea is highly complex and even the simplest disruption of the corneal epithelium produces a substantial amount of pain due to nerve fibres from the ophthalmic division of the trigeminal nerve; meaning it is usually difficult for the patient to cooperate or even open their eye for an examination (Swaminathan et al. 2015). According to Bryant & Knights (2015, p. 685), ocular local anaesthetics currently available for administration as eye drops by doctors and ophthalmologists are amethocaine (0.5%, 1%), ocybuprocain (0.4%) and proxumetacaine (0.5%). These all offer a rapid onset on 10-20 seconds with duration of 10-20 minutes and have no adverse effect on eye function or healing (Bryant & Knights, 2015). Ocular local anaesthetics work much like other anaesthetics by temporarily inhibiting neuronal action potentials to the brain for pain perception (Bryant & Knights, 2015). Amethocaine (also referred to as tetracaine) is indicated for minor corneal injuries/foreign body removal in most rural settings of Australia (NSW, 2012).

Currently, no urban Australian ambulance service offers topical local anaesthetic treatment for minor eye injuries or relief eye drops of any kind (QAS, 2015). For example, the Queensland Ambulance Service (QAS) DTP instructs paramedics to irrigate eye injuries (chemical, biological fluid exposure, foreign body or thermal burns) with saline only accompanied by the recommendation of antiemetic administration for major injuries (QAS, 2015). Therefore, throughout this report the implications of introducing this analgesic eye drop to the DTP will be addressed, along with discussions of previous clinical trials and research to justify its safe and effective use and overall why

paramedics should carry it onboard ambulances.

RESEARCH

Five research articles have been chosen and will briefly be discussed in order to evaluate the outcomes from previous clinical trials and reviews on amethocaine, in order to decide if it will be a valuable substance in emergency medicine. Although limited research exists on this exact topic, all efforts have been made for the closest possible topic-related research to justify the main aim of this report.

Ball et al. (2010) composed an original clinical trial to evaluate the analgesic efficacy for acute corneal injuries in the emergency department with a 0.05% dilute topical proparacaine (a similar ophthalmic anaesthetic to amethocaine). This design study was a double-blinded, randomized placebo-controlled trial consisting of 33 adults with corneal injuries. Patients were asked to record their pain scale on a 10cm visual analog scale at 5minutes pre and post administration. The mean pain reduction was 3.9cm improvement in the intervention (proparacaine) group and a 0.6cm improvement in the control. All participants attended a check-up by an ophthalmologist on days 1, 3 and 5 who reported nil ocular complications or evidence of delayed healing. Although this was a small study group, it does provide evidence that local anaesthetic eye drops have an effective analgesic use in with safe outcomes (Ball et al. 2010).

Waldman, Denise & Herbison (2014) conducted the largest clinical trial to determine if topical tetracaine drops would be safe and effective to use (over a 24 hour period) in patients who presented with pain caused by corneal abrasions to the emergency department. This study was a 12-month double blinded, randomized trial, comparing 1% tetracaine drops to placebo saline drops amongst 116 patients within an emergency department of a regional tertiary. The inclusion criteria strictly included simple, uncomplicated corneal abrasion from mechanical trauma, UV keratitis or foreign body removal. 69.8% of patients received follow-up consultations with no complications identified with the topical anaesthetic. This study confirms that tetracaine drops are safe for health professionals to administer (up to 24 hours) and

patients reported an overall satisfaction, thus is recommended to become standard practice within the emergency pre hospital practice (Waldman, Denise & Herbison, 2014).

Due to the increasing amount of literature demonstrating the safety of ocular anaesthetics, Swaminathan et al. (2015) decided to conduct a broad systematic search and produced a clinical review to evaluate an overall outcome based on the ocular anaesthetics use for the treatment of corneal abrasions within the emergency department. Swaminathan et al (2015, p. 811) discovered there were limited trials performed on this exact criterion. Therefore, four of the six articles assessed ocular topical anaesthetic use in patients who underwent photorefractive keratectomy (PRK) were considered. Even though the lesion was caused by the procedure it was considered valuable, as it required the same type of post treatment.

Of the four, the first was by Verma et al. (in Swaminathan et al. 2015) who composed a prospective, randomized, double- blinded trial with 44 patients, treated with tetracaine post PRK. The tetracaine group reported reduced pain from a scale of 10 to 2.5, whereas the placebo reported a decrease of pain from 10 to 6.5. Epithelial closure was the same in both groups at 72hr full recovery. Verma et al. (in Swaminathan et al. 2015) decided to do another study two years later comparing tetracaine vs bupivacaine including 38 patients. Again, all patients had full recovery within 72hrs and both topical anaesthetics had potent analgesic effects.

The third study by Shahinia et al. (in Swaminathan et al. 2015) aimed to determine if there is a non-anaesthetic and nontoxic concentration of topical proparacaine to improve analgesic effects post PRK. This trial consisted of 50 patients given 0.05% proparacaine in increasing doses vs placebo. The proparacaine group had 92% of patients satisfied with the analgesic eye drops and 70% in the placebo group, again there was no difference between healing times between both groups.

The final literature found by Swaminathan et al. 2015 by Brilakis was a study

on analgesic effectiveness of 0.5% tetracaine and effect on epithelial healing. 49 patients post PRK received tetracaine drops for 3 days but was not compared to a placebo group. This study concluded with no patient epithelial defects or adverse side effects. On the basis of this literature, Swaminathan et al (2015) concludes after extensive research tetracaine is an effective ocular anaesthetic but should only be used short-term.

Faktotvich & Melwani (2014) provided a comprehensive comparison of randomized trials aimed to find the best analgesic treatment post PRK. 23 prospective studies were found comparing non-steroid anti-inflammatory drugs, opiates, acetaminophen, pregabalin, gabapentin and topical anaesthetics. This study concluded that tetracaine 1% and nepafenac 0.1% had the most analgesic effect out of all analgesics. However, did show slight delay in corneal re-epithelialization when compared to against a placebo group. Again, this study advises tetracaine is an effective local anaesthetic but does have the chance of increasing the risk of corneal healing recovery time.

Ufbrey & Karras (2014) published a review challenging the dogma of using tetracaine for the treatment of corneal abrasions. This review asked the question as to why emergency physicians have been taught in the past that topical anaesthetics are associated with poor healing of the corneal and why they aren't being used in all emergency services. It concluded that this fear stemmed from laboratory-based study trials with prolonged, overuse and abuse of topical anaesthetics causing ocular damage. However, Ufbrey & Karras (2014) reviewed tetracaine to be an effective analgesia in short-term use. With hope, this inexpensive medication, once perceived, as 'off-limits' to patients in emergency departments will soon be an everyday analgesic in the paramedics drug kit (Ufbrey & Karras, 2014).

Overall, this report can conclude the use of ocular local anaesthetics for a short period of time is safe and effective, however it is inconclusive whether it is safe for outpatient regular use. Perhaps future research and trials with a larger realm of patients could answer any remaining questions and provide reassurance regarding its safety.

DISCUSSION

Ocular local anaesthetics appear to be a recently focused topic of discussion within prospective emergency medicines. The current findings throughout clinical trials and systematic reviews reinforce previous findings for amethocaine (aka tetracaine) to be a safe and potent ocular analgesic for short-term use, demonstrating it to be a useful medicine within the ambulance services.

The Victoria State Government (2014) states the contraindications for amethocaine are to avoid treating patients if they have an allergic reaction to any medication containing amethocaine or local anaesthetics and do not mix with medications from the sulfonamide group. The reported side effects are stinging or burning sensation and prolonged blurred vision with watery eyes (Victoria State Government, 2014).

Amethocaine is currently being used in some rural settings of Australia. For example in the New South Wales (NSW), the Department of Health considers amethocaine hydrochloride eye drops an essential medicine for their rural emergency drug protocols. Clinical guidelines state they are to be administered by nurses and medical staff, indicated for corneal foreign bodies/abrasions and chemical exposures (NSW Government, 2012).

Bauch & Lamb Australia Pty Ltd (2016, pers.comm., 8 February), the manufacturers and suppliers of Minims Amethocaine eye drops confirmed that this product is available in a box of 20 single units containing 0.5mL with a retail price of \$75 per box and have a shelf life of 18 months. Thus, the cost per single dose would be equivalent to \$3.75. Moreover, due to the reported 10% of emergency eye-related injuries, it is highly likely the full box of 20 would be used within an 18-month period. Amethocaine eye drops also require refrigeration storage, considering most ambulance trucks are equipped with cool refrigeration system, this would be feasible.

This product would be available for all levels of Advanced Care Paramedics to

administer and requires no further training; it would be added directly to the QAS DTPs. This simple, inexpensive solution of local anaesthetic eye drops could allow paramedics to easily examine the eye for foreign material, remove it and help stop the patients' natural instinct to scratch or rub the eye, causing further damage. Moreover, by supplying local anaesthetic to the targeted area, less pain medications (requiring IV access) such as morphine might need to be used.

CONCLUSION

To conclude, the research provided within this report proves that amethocaine is an effective analgesic eye drop with low-risk side-effects, indicated for minor eye injuries/corneal abrasions/removal of foreign body. As discussed, there are many benefits of introducing these eye drops for both the patient and emergency services. Amethocaine is a highly recommended medication to introduce within all ambulances services, considering further injury prevention and pain management are the fundamental services provided by paramedics.

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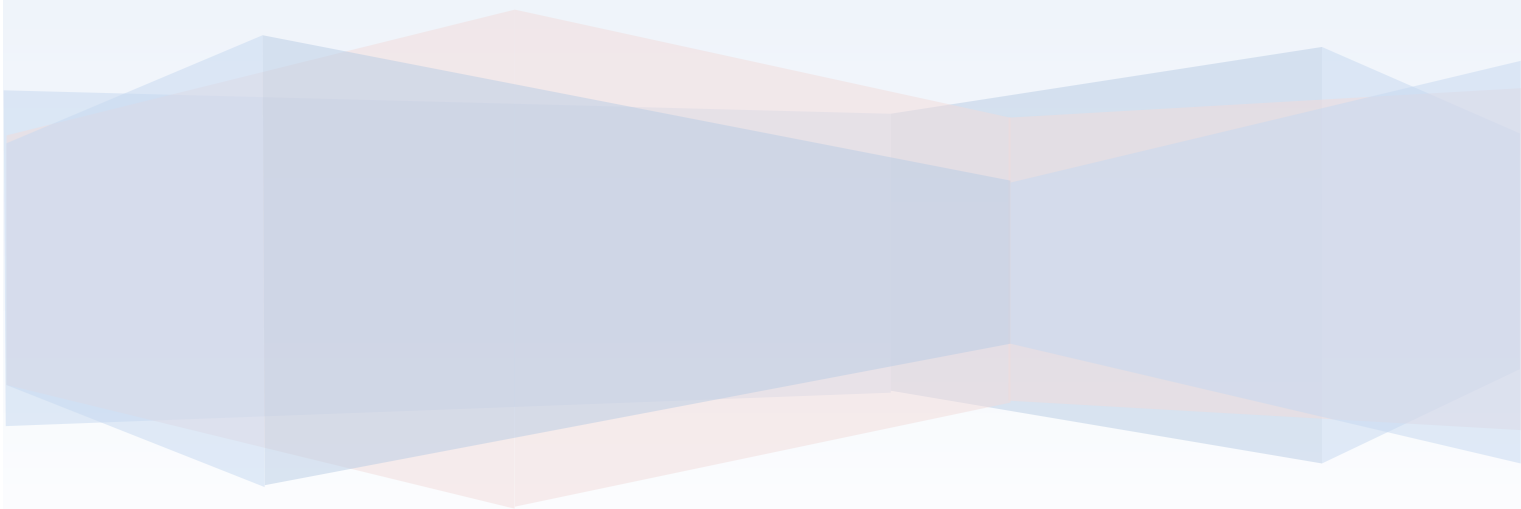
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Sumatriptan Use in a Pre-Hospital Environment – An Analysis & Review

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Abstract

Sumatriptan is a widely used pharmacotherapy in the abortion of acute migraine headaches, however as yet, has not been shown as being utilized in a pre-hospital setting. Patients complaining of acute migraine presentations are currently administered narcotic analgesia and/or an anti-emetic by paramedics, as a migraine- specific drug has not yet been introduced for use by the Queensland Ambulance Service (QAS). This report aims to evaluate and analyse the use of Sumatriptan as a first line treatment in acute migraine headaches vs. currently utilized pharmacotherapy treatment plans. Providing specific examples and previously conducted studies, this report aims to arrive at a conclusion regarding the safety and efficacy of introducing a triptan into QAS's already extensive drug therapy protocols. This report was written assuming that the prior knowledge of the audience is of a university-educated paramedic standard.

Introduction

This report aims to provide a critical review on the currently available literature for the administration of Sumatriptan in patients with acute migraine headaches. The report will evaluate Sumatriptan in detail, providing an outline of its pharmacology, routes of administration, dosages and side effects, in order to assess its efficacy and potential use within the Queensland Ambulance Service (QAS).

Research Articles

Articles utilised in this report review the use of Sumatriptan as a first-line treatment in acute migraine headaches. Each article was obtained through the use of MedScape, using specific search combinations such as 'Sumatriptan', 'triptan', 'migraine', 'comparison' and 'review'. Participants in all studies reviewed had experienced acute migraine attacks, with or without aura, most commonly presenting to an emergency physician or general practitioner. All participants were considered to be of adult age, and nil mention of trials involving paediatric or geriatric participants were included.

Discussion

Moore et al (2012) explain that Sumatriptan is a specific vascular 5-hydroxytryptamine-1 (5HT₁) receptor agonist released in the early 1990's for the treatment of acute migraine headaches. They continue on to indicate that whilst the exact mechanism of action of Sumatriptan remains unclear, it is known to promote vasoconstriction of cerebral vessels and works to inhibit areas of neurogenic inflammation around these vessels. It is further suggested that Sumatriptan also exerts effect via reduction of the neuronal activity within the trigemino-vascular system. Additionally, it may also block the release of vasoactive neuropeptides from trigeminal neurons by binding to 5HT₁ receptors pre-synaptically, resulting in a prevention of central sensitization and hyperalgesia. Triptans are also able to modulate the transmission of trigemino-vascular neurons at the level of the thalamus and periaqueductal gray matter, suggesting that they may act at a higher level of the brain to regulate painful sensory information than initially thought (Moore et al. 2012).

A meta-analysis and systematic review conducted by Cameron et al. (2015) compared the relative efficacy of triptans to non-steroidal anti-inflammatory drugs (NSAIDs), acetylsalicylic acid (ASA), paracetamol, ergots, opioids and anti-emetics, in the abortion of acute migraines. From 133 random controlled trials, a standard dose of triptans was proved to relieve migraines within a 2-hour window in 42-76% of patients and provide 2 hours of sustained pain relief in 18-50% of patients. The review notes that a standard dose of triptans was able to provide sustained relief at 24 hours in 29-50% of patients. A standard dose of triptan achieved significantly better outcomes (42-76%) than ergots (38%) and equal or better outcomes than NSAIDs, ASA and paracetamol (46-52%). Among the triptans evaluated, Sumatriptan (subcutaneous injection) was associated with the most favourable outcomes.

Marmura et al. (2015) provided an evidence assessment of migraine pharmacotherapies from the American Headache Society. Within this article, a study of Sumatriptan subcutaneous injection reported 2-hour headache relief in 70% of patients, in comparison to 22% of patients administered a placebo. Subcutaneous Sumatriptan injections showed superiority at 10 minutes for migraine relief (11% vs. 6%; $P=0.039$). The article also provided insight into the efficacy of intranasal Sumatriptan in comparison to a placebo for a single migraine attack. Both the 10mg (54%) and 20mg (57%) doses proved superior over the placebo administration (25%) in migraine freedom and relief at 2 hours (10mg 84% vs. 44%, $P<0.001$; 20mg 80% vs. 44%, $P<0.01$). The study states that Sumatriptan, ergots, NSAIDs and opioids are all effective in relief of acute migraine attacks, however the evidence base should be considered alongside the potential side effects, adverse reactions and contraindications, and drug-to-drug interactions when making a decision on the medication to prescribe for acute therapy of a migraine.

Becker (2015) reviewed the current acute migraine pharmacotherapies in adults. Whilst this article does not provide a large number of statistics in comparison to those already discussed, it provides considerable factual insight into the use of triptans in migraine treatment. Becker (2015) suggests that evidence is indicative of subcutaneous Sumatriptan not providing the same

efficacy when administered during the migraine aura. The recommendation from this finding is that patients are to be administered Sumatriptan at the onset of their migraine pain, however many patients do not experience pain until the aura occurs. Anecdotally, Becker (2015) states many patients still report efficacy and success with triptan use during the aura, and its administration during the typical migraine aura has been deemed safe. The article also states that the majority of patients with symptom recurrence after Sumatriptan administration will respond positively to a secondary dose of the same strength.

An article by Dahlof et al. (2012) focuses on the adverse reactions of Sumatriptan. This study states that approximately 60% of patients in clinical trials complain of burning/stinging at the SC injection site. This event could be easily avoided with the administration of intranasal Sumatriptan, which provides the same effects, however has a delayed onset of action in comparison to the subcutaneous route. This is evidently a situation whereby clinical judgment and a risk-benefit analysis would come into play for paramedics if QAS adopted Sumatriptan into its current drug therapy. Patients also noted warm sensations, tightness, tingling, flushing and feelings of heaviness or pressure in areas such as the face, limbs and chest. These events have been designated the term 'triptan sensations' as they have been unavoidable in all triptan compounds developed to date. In the administration of intranasal Sumatriptan, approximately 25% of patient note a disturbance in taste, often described as 'bad', 'bitter', 'unpleasant' or 'unusual'. Finally, Dahlof et al (2012) conclude that whilst Sumatriptan is available in different formulations, parenteral administration is associated with a faster onset of action and increased efficacy.

Several studies are indicative of the fact that despite evidence signifying triptans' superiority over placebos, the migraine-specific therapy continues to be underutilized in the emergency department (ED). An article by Minen et al. (2014) suggests that ED management of patients presenting with migraine should pose as a target for quality improvement, with the goal of decreased opioid prescriptions and administration of more specific treatments. Minen et al. (2014) continue on to state that opioids are administered in up to 60% of ED migraine patients, however the reasons behind this remain under-explored.

They suggest emergency physicians favouring opioids over a more specific therapy such as Sumatriptan, is due to a lack of exposure and clinical knowledge. Whilst this article does not address treatment of migraines within a pre-hospital environment, it stands relevant in the fact that many paramedics may exert hesitation in administering a migraine-specific therapy in these patients due to a lack of prior exposure.

Conclusion

Through analysis and critical review of the aforementioned journal articles, Sumatriptan is deemed to provide a safe and effective means for treatment of acute migraine attacks. QAS currently has no migraine-specific pharmacotherapies, relying primarily on opioids and anti-emetics for control of symptoms. Evidence is supportive of the inclusion of Sumatriptan into the drug therapy currently utilized by QAS, with the following protocol providing a recommendation and template for its use.

Drug Therapy Protocol

Drug Class

- 5HT1 receptor agonist

Pharmacology

Selective 5-HT1 receptor agonist in cranial arteries; elicits vasoconstrictive and anti-inflammatory effects; associated with antidromic neuronal transmission and relief of migraine headache.

Metabolism

Sumatriptan is primarily eliminated by oxidative metabolism, specifically mediated by monoamine oxidase A. The major metabolite of Sumatriptan is its indole acetic acid analogue, and is mainly excreted in the urine as a free acid and the glucuronide conjugate.

Indications

- Acute Migraine Headache +/- Aura

Contraindications

- | | |
|--|--|
| <ul style="list-style-type: none">• KSAR/Hypersensitivity to Sumatriptan or any component• Patients <12yo (All administration)• Patients 12-17yo (All administration excluding intranasal)• History of Myocardial Infarction• Peripheral Vascular Disease/Ischaemic Heart Disease• Prinzmetal's angina/coronary vasospasm• Uncontrolled hypertension• Cerebrovascular Accident or Transient Ischaemic Attack | <ul style="list-style-type: none">• Severe Hepatic Impairment• Ergotamine-containing or ergot-type medication (e.g. dihydroergotamine, methysergide) administration in the previous 24 hours• Monoamine Oxidase Inhibitor (MAOI) administration within the previous 2 weeks• Hemiplegic, basilar or ophthalmoplegic migraines• Pregnancy |
|--|--|

Precautions

- | | |
|--|---|
| <ul style="list-style-type: none">• Impaired hepatic or renal function• KSAR or hypersensitivity to sulphonamides• Asthmatics (May react to intranasal administration)• Patients <65yo | <ul style="list-style-type: none">• Administration within 24 hours of other 5-HT1 agonists• Patients with controlled hypertension• Breastfeeding patients |
|--|---|

Side Effects

Including, but not limited to;

- Flushing, dizziness and feelings of weakness
 - Fatigue
 - Increase in BP
 - Dyspnoea
 - Irritation/burning in nose or throat, epistaxis (Intranasal administration)
 - Pain, stinging/burning, swelling, erythema, bruising and bleeding at injection site (Subcutaneous administration)
-

Presentation

- 6mg/0.5mL pre-filled syringe
 - 10mg/0.1mL single use nasal spray device
-

Routes of Administration

- Subcutaneous (SC)
 - Intranasal (NAS)
-

Timing

- Onset (SC) – 10 minutes; (NAS) – 30min
 - Duration- 9-24 hours
 - Half-Life – 2 hours
-

Adult Dosages

SC

6mg.

Repeated at 6mg after 1 hour if symptoms recur.

Total Maximum Dose 12mg in 24 hours.

NAS

20mg into ONE nostril.

Repeated at 20mg after 2 hours if symptoms recur.

Total Maximum Dose 40mg in 24 hours

Paediatric Dosages

NAS

≥12yo

10-20mg into ONE nostril.

Repeated at up to 20mg after 2 hours if symptoms recur.

Total Maximum Dose 40mg in 24 hours.

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