

Bupivacaine in the ED: underutilised and scope for improved patient care

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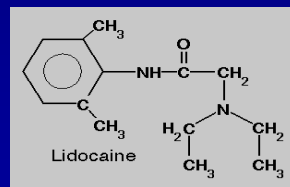
Introduction

- Lignocaine and bupivacaine are local anaesthetics (LA) commonly used in the ED
- The selection of LA is affected by:
 - drug potency
 - duration of anaesthesia
 - speed of onset
 - safety



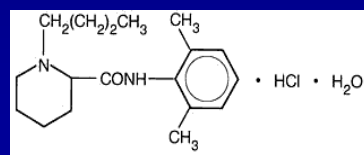
Introduction: Lignocaine

- ‘General purpose’ LA:
 - wound repair
 - invasive procedures
 - local and regional blocks
- Advantages:
 - high efficacy
 - fast onset
 - low toxicity
- Disadvantages:
 - injection can be painful
 - duration of action moderate



Introduction: Bupivacaine

- Advantages:
 - Prolonged duration of action:
 - long procedures
 - long post-procedural anaesthesia
 - Less pain on injection
 - More effective digital block
- Disadvantages:
 - Slower onset time
 - More toxic (cardiac tissue)
 - Hypotension
 - Bradycardia



Introduction:

- The evidence indicates that bupivacaine is superior to lignocaine in:
 - significantly reducing pain following wound repair
(Spivey, Ann Emerg Med 1987)
 - achieving complete anaesthesia in digital blocks
(Reichl, J Hand Surg 1987)
- Despite potential advantages in specific circumstances, anecdotal evidence suggests that bupivacaine is underutilized



Introduction: Aims & Purpose

This study aimed to determine:

- Patterns of LA use
- Suitability of LA choice
- ED doctor knowledge and perceived use of LA
- Barriers to bupivacaine use

Its purpose was to make recommendations for improvements in clinical practice based upon the available evidence

Methods

- Multi-faceted study comprising a:
 - retrospective chart review
 - review of LA ordering patterns
 - cross sectional survey of ED doctors
- EDs of the Royal Melbourne and Austin hospitals
- 50,000-55,000 patients
- January-April 2006
- Authorized by the respective Ethics Committees

Methods: Chart Review

- Patients who presented over 12 months (1/11/04-31/10/05):
 - ≥ 18 years
 - ICD10 codes 'laceration, dislocation, fractures or abscess'
- Computer-generated random selection of sample
- The charts retrieved – enrolled if administered a LA
- Estimated ~ 5% of patients receive bupivacaine.
To be 95% sure that sample prevalence would lie $\pm 5\%$,
a sample of >76 patients was required

Methods: Chart Review

- Data collection document:
 - Specific for the study, trialled and revised
 - Single extractor (15% charts checked)
- Data:
 - patient demographics & nature of injury
 - LA used & factors potentially impacting on choice (eg known allergy, cardiac condition)
- Two EPs reviewed the data separately
 - Determined suitability of LA used
 - Consensus decision after further discussion

Methods: LA ordering patterns

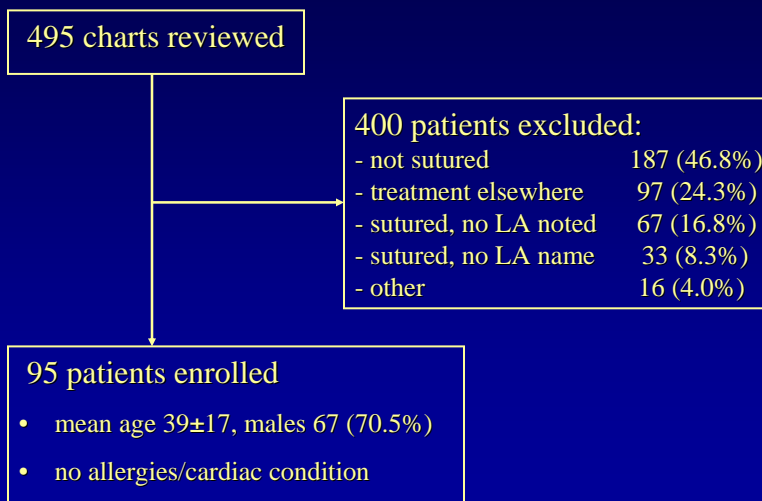
- ED pharmacy records at each site
- The amount & nature of all LA ordered over 2 years (2004-2005)



Methods: Survey of ED doctors

- Convenience sample (consultants/registrars) at both sites
- Surveyed at meetings or questionnaires in mailboxes
- Self-administered questionnaire, designed specifically
 - examined for readability and face validity
 - trialled and revised prior to use
- Data collected:
 - preferences for these agents in given clinical scenarios
 - knowledge of lignocaine and bupivacaine
 - perceived barriers to the use of bupivacaine

Results: Chart Review



Results: Distribution and nature of injuries

	Fracture	Laceration
Head and neck	-	17 (17.9%)
Chest	-	2 (2.1%)
Abdomen	-	0 (0.0%)
Back	-	1 (1.1%)
Perineum	-	2 (2.1%)
Arm and shoulder	-	3 (3.1%)
Forearm	2 (2.1%)	9 (9.5%)
Hand	4 (4.2%)	36 (37.9%)
Thigh	-	3 (3.1%)
Leg	-	11 (11.6%)
Foot	-	5 (5.3%)
Total	6 (6.3%)	89 (93.7%)

Results: Nature and type of LA administered

	wound infiltration	digital block	Bier's block	other	not recorded	n (%)
lignocaine (1%)	33	5	-	-	-	38 (40.0)
lignocaine (2%)	19	2	-	-	-	21 (22.1)
lignocaine (?%)	1	-	-	-	1	2 (2.1)
lignocaine (1%)/adren.	13	-	-	-	-	13 (13.7)
lignocaine (2%)/adren.	2	-	-	-	-	2 (2.1)
lignocaine (?%)/adren.	10	-	-	-	-	10 (10.5)
prilocaine (0.5%)	-	1	4	-	-	5 (5.3)
bupivacaine (0.5%)	1	1	-	-	-	2 (2.1)
other	-	-	-	2*	-	2 (2.1)
Total n (%)	79 (83.2)	9 (9.5)	4 (4.2)	2 (2.1)	1 (1.1)	95 (100)

* fig. 2% + bupiv both used for digital block (1), lig. 1% and 2% infiltrated + digital block (1)

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Results: Appropriateness of bupivacaine compared to LA used

Appropriateness	number	(%)
Bupivacaine contraindicated	0	(0.0)
Bupivacaine less appropriate than LA used	4*	(4.2)
Bupivacaine equivalent to LA used	87	(91.6)
Bupivacaine more appropriate than LA used	4**	(4.2)
Total	95	(100)

* Bier's blocks

** fractured head of 4th and 5th metacarpal (1)

fracture at metacarpophalangeal joint with mild angulation (1)

full thickness skin square removed from hand, dirty wound (1)

almost complete amputation at level of thumb nail bed (1)

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Results: LA ordered by the EDs in 2004-2005

	RMH	Austin
Lignocaine 1% (5ml amps)	3884	5032
Lignocaine 2% (5ml amps)	3015	3351
Lignocaine 1% / Adren. 1:100,000 (5ml amps)	3625	625
Lignocaine 1% / Adren. 1: 200,000 (20ml amps)	46	0
Lignocaine 2% / Adren. 1:80,000 (2.2ml amps)	0	294
Bupivacaine 0.5% (10ml amps)	345	216
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3.2%

Results: Survey of ED doctors

- 30 of 34 doctors participated (88.2% response rate)
 - 21 (70%) consultants
 - 24 (80%) working in ED for > 6 years

Results: Choice of LA in 5 clinical scenarios

	Lignocaine	Bupivacaine	other
Local wound infiltration	30 (100)	0 (0.0)	0 (0)
Digital block for crush injury	15 (50.0)	14 (46.7)	1* (3.3)
Digital block for laceration	29 (96.7)	1 (3.3)	0 (0.0)
Bier's block	4 (13.3)	5 (16.7)	21** (70.0)
Femoral nerve block	0 (0.0)	28 (93.3)	2*** (6.7)

*'wouldn't use unless I was repairing'

** prilocaine as the alternative

*** preferred a combination of bupivacaine and lignocaine



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Results: LA knowledge

	lignocaine no. (%)	bupivacaine no. (%)	no difference no. (%)	not sure no. (%)
Which drug has the faster onset?	<u>24 (80.0)</u>	0 (0.0)	4 (13.3)	2 (6.7)
Which drug has the longer duration?	1 (3.3)	<u>29 (96.7)</u>	0 (0.0)	0 (0.0)
Which drug is more painful on injection?	<u>10 (33.3)</u>	1 (3.3)	8 (26.7)	11 (36.7)
Which drug is more cardio-toxic?	6 (20.0)	<u>20 (66.7)</u>	1 (3.3)	3 (10.0)

Results: Perceived barriers to the use of bupivacaine

(more than one choice allowed)

Factors	no. (%)
Habit in using alternatives	14 (46.7)
Cardiac toxicity	12 (40.0)
Slower onset than alternatives	9 (30.0)
Personal preference	7 (23.3)
Longer duration of action	6 (20.0)
Cost	3 (10.0)
Other*	3 (10.0)
Pain upon injection	0 (0.0)

* bupivacaine not readily available (2), bupivacaine is well known to junior doctors (1)

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Summary

- Bupivacaine underutilized
 - Chart review:
 - 3 cases where bupivacaine were given
 - 4 cases where bupivacaine a better alternative
 - 87 cases where bupivacaine equivalent but may have conferred advantage through duration of action
 - Survey:
 - 53.3% would not use bupivacaine for crushed finger
 - Estimated use 12.8% (doctors) versus 3.2% (actual)

Summary

- Inappropriate LA use
 - 16.7% would use bupivacaine for a Bier's block
- LA knowledge could be improved
 - speed of onset
 - pain upon injection
- Scope for improvement in patient care:
 - barriers to bupivacaine frequently non-clinical (habit, availability, familiarity)
- Chart documentation poor

Recommendations



- Critical review of local LA use
 - personal and departmental level
 - guidelines for use
- Education regarding evidence-based use of LA
- Increase accessibility to bupivacaine
- Research of the patient LA experience
 - slow onset versus long duration
- Improvement in chart documentation
 - medico-legal considerations