

SUMMARY OF PRODUCT CHARACTERISTICS

1 NAME OF THE MEDICINAL PRODUCT

Bupivacaine Hydrochloride 0.1% w/v Solution for Infusion

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each 100ml contains anhydrous bupivacaine hydrochloride 0.10g equivalent to 0.1055g of bupivacaine hydrochloride.

For excipients, see 6.1

3 PHARMACEUTICAL FORM

Solution for Infusion

4 CLINICAL PARTICULARS

4.1 Therapeutic indications

Bupivacaine Hydrochloride Infusion Solution 0.1% w/v may be used:

- 1) for continuous infusion lumbar epidural analgesia to relieve pain during labour
- 2) for continuous infusion epidural analgesia to control postoperative pain

4.2 Posology and method of administration

Route of Administration: Epidural infusion.

Bupivacaine Hydrochloride Infusion Solution should only be used by, or under the supervision of, clinicians experienced in regional anaesthesia.

Every precaution should be taken to avoid accidental intravascular administration; careful aspiration is essential. Prior to commencing a continuous epidural infusion, satisfactory epidural block should be established with test and loading doses of local anaesthetic. A test dose containing adrenaline is recommended, since an intravascular injection of an adrenaline-containing solution may be recognised by an increase in heart rate. A test dose of 7.5mg of bupivacaine 0.25% (3ml) or 10mg of bupivacaine 0.5% (2ml)

containing adrenaline may be used. Verbal contact with the patient and repeated measurements of heart rate (ECG) should be maintained following the test dose. Aspiration should be repeated prior to administration of the loading dose and before starting the infusion. Epidural block can usually be established with test and loading doses (total volume 8 – 12ml of bupivacaine 0.25%) and sufficient time should be allowed to confirm that a satisfactory block has been established before commencing the infusion. If symptoms of toxicity or signs of an intrathecal blockade occur, the infusion should be stopped immediately.

Following the start of an infusion a continuous review of the patient is required with adequate clinical monitoring, (a minimum being the recording of blood pressure/pulse pain and sedation assessments). Segmental testing of the level of the block is required at least at 2 hourly intervals throughout the time the infusion is administered. For obstetric analgesia the test level T5/T6 should be clearly marked, for postoperative analgesia the level of block should be determined relative to the site of surgery. Appropriate monitoring should be carried out to detect progressive spread of the block or an increasing density of block.

Adequate filtering should be an integral part of the infusion line. The infusion line should be clearly marked to avoid confusion with intravenous lines. Also to avoid confusion, consideration should be given to using a different brand of proprietary pump to that used for IV infusions. In addition, the following pump specifications should be considered:-

- accurate infusion rates down to 1ml/hour should be able to be set.
- positive pressure drive, (not gravity feed), should be present.
- a back-up battery should be present.
- an automatic infusion shut-off should be present in case power is lost or the front of the pump is accidentally opened.

The lowest dose required to provide adequate analgesia should be given. A maximum dose of bupivacaine 2mg/kg should not be exceeded in any 4 hour period. The total dose of bupivacaine over 24 hours should not exceed 400mg.

The length of continuous epidural infusions given post-operatively should be minimised, due to the increased risks of reaching a toxic plasma concentration, inducing local neural injury or local infection. Administration of bupivacaine epidural infusion has not been adequately studied for more than 72 hours

The dosages in the following table are recommended as a guide for use in healthy adults during labour and in the post operative period. It should not be necessary to exceed an infusion dosage of bupivacaine 20mg/hour. The dosage should be titrated to meet the individual requirements and the lowest effective dosage should be used.

In the management of post-operative pain, the dose given during surgery should be taken into account.

It may be possible to reduce the dose of bupivacaine when epidural opioids are co-administered.

Children: Not recommended

Indication	Type of Block	% Concentration	Infusion rate per Hour	
			ml	mg
Analgesia in labour	Continuous infusion lumbar epidural	0.1	10 – 15	10 – 15
Control of post operative pain	Continuous infusion epidural: Thoracic, upper abdominal, lower abdominal	0.1	4 - 15	4 - 15

4.3 Contraindications

Bupivacaine hydrochloride solutions are contra-indicated in patients with a known hypersensitivity to local anaesthetic agents of the amide group or to other components of the infusion formulation. Solutions of bupivacaine hydrochloride are contra-indicated for intravenous regional anaesthesia (Bier's block).

Epidural anaesthesia, regardless of the local anaesthetic used, has its own contra-indications which include: Active disease of the central nervous system such as meningitis, poliomyelitis, intracranial haemorrhage, subacute combined degeneration of the cord due to pernicious anaemia, and cerebral or spinal tumours. Tuberculosis of the spine. Pyogenic infection of the skin at or adjacent to the site of lumbar puncture. Spina bifida or meningomyelocele. A diagnosed arteriovenous malformation in the vertebral column in close proximity to the proposed puncture site. Cardiogenic or hypovolaemic shock. Coagulation disorders or ongoing anticoagulant therapy. Epidural and spinal anaesthesia is contra-indicated in patients with an expanding cerebral lesion, a tumour, cyst or abscess, which may, if the intracranial pressure is suddenly altered, cause obstruction to the cerebrospinal fluid or blood circulation (the pressure cone).

4.4 Special warnings and precautions for use

There have been reports of cardiac arrest during the use of bupivacaine for epidural anaesthesia or peripheral nerve blockade where resuscitative efforts have been difficult, and were required to be prolonged before the patient responded. However, in some instances resuscitation has proven impossible despite apparently adequate preparation and appropriate management.

Like all local anaesthetic drugs, bupivacaine may cause acute toxicity effects on the central nervous and cardiovascular systems if utilised for local anaesthetic procedures resulting in high blood concentrations of the drug. This is especially the case after unintentional intravascular administration or injection into highly vascular areas. Ventricular arrhythmia, ventricular fibrillation, sudden cardiovascular collapse and death have been reported in connection with high systemic concentrations of bupivacaine.

Adequate resuscitation equipment should be available whenever local or general anaesthesia is administered. The clinician responsible should take the necessary precautions to avoid intravascular injection (see 4.2).

Before any nerve block is attempted, intravenous access for resuscitation purposes should be established. Clinicians should have received adequate and appropriate training in the procedure to be performed and should be familiar with the diagnosis and treatment of side effects, systemic toxicity or other complications (see 4.9 & 4.8).

Major peripheral nerve blocks may require the administration of a large volume of local anaesthetic in areas of high vascularity, often close to large vessels where there is an increased risk of intravascular injection and/or systemic absorption. This may lead to high plasma concentrations.

Overdosage or accidental intravenous injection may give rise to toxic reactions.

Injection of repeated doses of bupivacaine hydrochloride may cause significant increases in blood levels with each repeated dose due to slow accumulation of the drug. Tolerance varies with the status of the patient.

Although regional anaesthesia is frequently the optimal anaesthetic technique, some patients require special attention in order to reduce the risk of dangerous side effects:

- The elderly and patients in poor general condition should be given reduced doses commensurate with their physical status.
- Patients with partial or complete heart block – due to the fact that local anaesthetics may depress myocardial conduction
- Patients with advanced liver disease or severe renal dysfunction
- Patients in the late stages of pregnancy
- Patients treated with anti-arrhythmic drugs class III (e.g. amiodarone) should be under close surveillance and ECG monitoring, since cardiac effects may be additive.

Only in rare cases have amide local anaesthetics been associated with allergic reactions (with anaphylactic shock developing in most severe instances).

Patients allergic to ester-type local anaesthetics drugs (procaine, tetracaine, benzocaine, etc) have not shown cross-sensitivity to agents of the amide-type such as bupivacaine.

Certain local anaesthetic procedures may be associated with serious adverse reactions, regardless of the local anaesthetic drug used.

- Local anaesthetics should be used with caution for epidural anaesthesia in patients with impaired cardiovascular function since they may be less able to

compensate for functional changes associated with the prolongation of A-V conduction produced by these drugs.

- The physiological effects generated by a central neural blockade are more pronounced in the presence of hypotension. Patients with hypovolaemia due to any cause can develop sudden and severe hypotension during epidural anaesthesia. Epidural anaesthesia should therefore be avoided or used with caution in patients with untreated hypovolaemia or significantly impaired venous return.
- Retrobulbar injections may very rarely reach the cranial subarachnoid space causing temporary blindness, cardiovascular collapse, apnoea, convulsions etc.
- Retro- and peribulbar injections of local anaesthetics carry a low risk of persistent ocular muscle dysfunction. The primary causes include trauma and/or local toxic effects on muscles and/or nerves. The severity of such tissue reactions is related to the degree of trauma, the concentration of the local anaesthetic and the duration of exposure of the tissue to the local anaesthetic. For this reason, as with all local anaesthetics, the lowest effective concentration and dose of local anaesthetic should be used.
- Vasoconstrictors may aggravate tissue reactions and should be used only when indicated.
- Small doses of local anaesthetics injected into the head and neck, including retrobulbar, dental and stellate ganglion blocks, may produce systemic toxicity due to inadvertent intra-arterial injection.
- Paracervical block may have a greater adverse effect on the foetus, than other nerve blocks used in obstetrics. Due to the systemic toxicity of bupivacaine, special care should be taken when using bupivacaine for paracervical block.
- There have been post-marketing reports of chondrolysis in patients receiving post-operative intra-articular continuous infusion of local anaesthetics. The majority of reported cases of chondrolysis have involved the shoulder joint. Due to multiple contributing factors and inconsistency in the scientific literature regarding mechanism of action, causality has not been established. Intra-articular continuous infusion is not an approved indication for Bupivacaine.

Local anaesthetics should be used with caution for epidural or spinal anaesthesia in the following situations: marked obesity, senility, cerebral atheroma, myocardial degeneration and toxemia.

Epidural and spinal anaesthesia with any local anaesthetic can cause hypotension and bradycardia which should be anticipated and appropriate precautions taken. These may include preloading the circulation with crystalloid or colloid solution. If hypotension develops it should be treated with a vasopressor such as ephedrine 10-15mg intravenously. Severe hypotension may result from hypovolaemia due to haemorrhage or dehydration or aorto-caval occlusion in patients with massive ascites, large abdominal tumours or late pregnancy. Marked hypotension should be avoided in patients with cardiac decompensation.

Patients with hypovolaemia due to any cause can develop sudden and severe hypotension during epidural anaesthesia.

Epidural anaesthesia can cause intercostal paralysis and patients with pleural effusions may suffer respiratory embarrassment. Septicaemia can increase the risk of intraspinal abscess formation in the postoperative period.

When bupivacaine is administered as intra-articular injection, caution is advised when recent major intra-articular trauma is suspected or extensive raw surfaces within the joint have been created by the surgical procedure, as that may accelerate absorption and result in higher plasma concentrations.

Epidural and spinal anaesthesia, properly performed, is generally well tolerated by obese patients and by those with obstructive lung disease. However, patients with a splinted diaphragm which interferes with breathing, such as those with hydramnios, large ovarian or uterine tumours, pregnancy, ascites or omental obesity are at risk from hypoxia due to respiratory inadequacy and aortocaval compression due to tumour mass. Lateral tilt, oxygen and mechanical ventilation should be used when indicated. Dosage should be reduced in such patients.

4.5 Interaction with other medicinal products and other forms of interaction

Bupivacaine should be used with caution in patients receiving other local anaesthetics or agents structurally related to amide-type local anaesthetics, e.g. certain anti-arrhythmics, such as lidocaine and mexiletine, since the systemic toxic effects are additive.

Epidural anaesthesia is contra-indicated in patients receiving anticoagulant therapy. Patients taking aspirin should have their bleeding time measured before epidural anaesthesia, as aspirin can prolong the bleeding time by inhibiting thromboxane A₂ formation in platelets. (Refer section 4.3)

Specific interaction studies with bupivacaine and anti-arrhythmic drugs class III (e.g. amiodarone) have not been performed, but caution should be advised. (See also section 4.4)

4.6 Fertility, Pregnancy and lactation

Pregnancy

There is no evidence of untoward effects in human pregnancy. In large doses there is evidence of decreased pup survival in rats and an embryological effect in rabbits if bupivacaine is administered in pregnancy. Bupivacaine should not therefore be given in early pregnancy unless the benefits are considered to outweigh the risks.

Foetal adverse effects due to local anaesthetics, such as foetal bradycardia, seem to be most apparent in paracervical block anaesthesia. Such effects may be due to high concentrations of anaesthetic reaching the foetus. (See also Section 4.4)

Breast-feeding

Bupivacaine enters the mother's milk, but in such small quantities that there is no risk of affecting the child at therapeutic dose levels.

4.7 Effects on ability to drive and use machines

In general, it is sufficient to allow 2 - 4 hours post nerve block or until full functions have returned following regional nerve block. In many situations, patients receive a sedative or other CNS (central nervous system) depressant drug e.g. diazepam, midazolam to allow the block to be performed. One must allow adequate time for the effects of these drugs to clear. Depending on dosage, local anaesthetics may have a very mild effect on mental function and co-ordination even in the absence of overt CNS toxicity and may temporarily impair locomotion and alertness.

4.8 Undesirable effects

Accidental sub-arachnoid injection can lead to very high spinal anaesthesia possibly with apnoea and severe hypotension.

The adverse reaction profile for Bupivacaine hydrochloride is similar to those for other long acting local anaesthetics. Adverse reactions caused by the drug per se are difficult to distinguish from the physiological effects of the nerve block (e.g., decrease in blood pressure, bradycardia), events caused directly (e.g., nerve trauma) or indirectly (e.g., epidural abscess) by needle puncture. Neurological damage is a rare but well recognised consequence of regional and particularly epidural and spinal anaesthesia. It may be due to several causes, e.g. direct injury to the spinal cord or spinal nerves, anterior spinal artery syndrome, injection of an irritant substance, or an injection of a non-sterile solution. These may result in localised areas of paraesthesia or anaesthesia, motor weakness, loss of sphincter control and paraplegia. Occasionally these are permanent.

The adverse reactions considered at least possibly related to treatment with Bupivacaine hydrochloride from clinical trials with related products and post-marketing experience are listed below by body system organ class and absolute frequency. Frequencies are defined as very common (1/10), common (1/100, < 1/10), uncommon (1/1,000, < 1/100), rare (1/10,000, < 1/1,000) or not known (identified through post-marketing safety surveillance and the frequency cannot be estimated from the available data).

Table of Adverse Drug Reactions (ADR)

System Organ Class	Frequency Classification	Adverse Drug Reaction
Immune system disorders	Rare	Allergic reactions, anaphylactic reaction/shock (see section 4.4)
Nervous system disorders	Common	paraesthesia, dizziness Following epidural injection of

		<p>some local anaesthetic agents including bupivacaine, high sympathetic blockade may occasionally result in ocular and other symptoms similar to those seen in Horner's syndrome. These effects are encountered more commonly in pregnant women.</p>
	Uncommon	<p>Signs and symptoms of CNS toxicity (convulsions, circumoral paraesthesia, numbness of the tongue, hyperacusis, visual disturbances, loss of consciousness, tremor, light headedness, tinnitus, dysarthria, muscle twitching)</p>
	Rare	<p>Neuropathy, peripheral nerve injury, arachnoiditis, paresis and paraplegia</p>
Eye disorders	Rare	Diplopia
Cardiac	Common	Bradycardia

disorders		(see section 4.4)
	Rare	Cardiac arrest (see section 4.4), cardiac arrhythmias
Vascular disorders	Very Common	Hypotension (see section 4.4)
	Common	Hypertension (see section 4.5)
Respiratory disorders	Rare	Respiratory depression
Gastrointestinal disorders	Very Common	Nausea
	Common	Vomiting
Renal and Urinary	Common	Urinary retention

Hepatic dysfunction, with reversible increases of SGOT, SGPT, alkaline phosphatase and bilirubin, has been observed following repeated injections or infusions of bupivacaine. If signs of hepatic dysfunction are observed during treatment with bupivacaine, the drug should be discontinued.

Reporting of suspected adverse reactions

Reporting of suspected adverse reactions after authorisations of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the Yellow Card Scheme Website:

www.mhra.gov.uk/yellowcard or search for MHRA Yellow Card in the Google Play or Apple App Store.

4.8.1 Acute systemic toxicity

Systemic toxic reactions primarily involve the central nervous system (CNS) and the cardiovascular system. Such reactions are caused by high blood concentrations of a local anaesthetic, which may appear due to (accidental) intravascular injection, overdose or exceptionally rapid absorption from highly vascularised areas (see section 4.4). CNS reactions are similar for all amide local anaesthetics, while cardiac reactions are more dependent on the drug, both quantitatively and qualitatively.

Central nervous system toxicity is a graded response with symptoms and signs of escalating severity. The first symptoms are usually light-headedness, circumoral paraesthesia, numbness of the tongue, hyperacusis, tinnitus and visual disturbances. Dysarthria, muscular twitching or tremors are more serious and precede the onset of generalised convulsions. These signs must not be mistaken for neurotic behaviour. Unconsciousness and grand mal

convulsions may follow, which may last from a few seconds to several minutes. Hypoxia and hypercarbia occur rapidly following convulsions due to the increased muscular activity, together with the interference with respiration and possible loss of functional airways. In severe cases apnoea may occur. Acidosis, hyperkalaemia and hypoxia increase and extend the toxic effects of local anaesthetics.

Recovery is due to redistribution of the local anaesthetic drug from the central nervous system and subsequent metabolism and excretion. Recovery may be rapid unless large amounts of the drug have been injected.

Cardiovascular system toxicity may be seen in severe cases and is generally preceded by signs of toxicity in the central nervous system. In patients under heavy sedation or receiving a general anaesthetic, prodromal CNS symptoms may be absent. Hypotension, bradycardia, arrhythmia and even cardiac arrest may occur as a result of high systemic concentrations of local anaesthetics, but in rare cases cardiac arrest has occurred without prodromal CNS effects.

4.8.2 Treatment of acute toxicity

If signs of acute systemic toxicity appear, injection of the local anaesthetic should be immediately stopped.

Treatment of a patient with systemic toxicity consists of arresting convulsions and ensuring adequate ventilation with oxygen, if necessary by assisted or controlled ventilation (respiration).

Once convulsions have been controlled and adequate ventilation of the lungs ensured, no other treatment is generally required.

If circulatory arrest should occur, immediate cardiopulmonary resuscitation should be instituted. Optimal oxygenation and ventilation and circulatory support as well as treatment of acidosis are of vital importance.

Cardiac arrest due to bupivacaine can be resistant to electrical defibrillation and resuscitation must be continued energetically for a prolonged period.

High or total spinal blockade causing respiratory paralysis and hypotension during epidural anaesthesia should be treated by ensuring and maintaining a patent airway and giving oxygen by assisted or controlled ventilation.

If cardiovascular depression occurs (hypotension, bradycardia) appropriate treatment with intravenous fluids, vasopressor, and or inotropic agents should be considered. Children should be given doses commensurate with age and weight.

4.9 Overdose

Accidental intravascular injections of local anaesthetics may cause immediate (within seconds to a few minutes) systemic toxic reactions. In the event of overdose, systemic toxicity appears later (15-60 minutes after injection) due to the slower increase in local anaesthetic blood concentration. (See sections 4.8.1 & 4.8.2).

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic Group (ATC code): N01B B51

Bupivacaine Hydrochloride is a long acting local anaesthetic of the amide type. It prevents the generation and conduction of the nerve impulse by decreasing the permeability of the nerve cell membrane to sodium ions. As well as blocking conduction in nerve axons in the peripheral nervous system, local anaesthetics interfere with the function of all organs in which conduction or transmission of impulses occur.

At high doses it produces surgical anaesthesia, while at lower doses it produces sensory block (analgesia) with less pronounced motor block.

Following absorption, bupivacaine may cause stimulation of the CNS followed by depression and in the cardiovascular system it acts primarily on the myocardium where it may decrease electrical excitability, conduction rate, force of contraction and eventually cardiac arrest.

5.2 Pharmacokinetic properties

Absorption

Like other local anaesthetics, the rate of systemic absorption of bupivacaine is dependent upon the total dose and concentration administered, the route of administration and the vascularity of the tissue locally. Bupivacaine is about 95% bound to plasma proteins, mainly to alpha-1-acid glycoprotein at low concentrations and to albumin at high concentrations.

Distribution

In adults, the terminal half-life of Bupivacaine is 2.7 hours. The maximum blood concentration varies with the site of injection. Foetal concentrations are lower than maternal concentrations because only the free, unbound drug is available for placental transfer.

Local anaesthetics are distributed to some extent to all body tissues, with higher concentrations found in highly perfused organs such as liver, heart and brain.

Elimination

Bupivacaine is metabolised in the liver and is excreted in the urine mainly as metabolites, with only 5 to 6% as unchanged drug

5.3 Preclinical safety data

No further relevant information other than that which is included in other parts of the Summary of Product Characteristics.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Sodium Chloride

Sodium Hydroxide

Water for Injections

6.2 Incompatibilities

Bupivacaine Hydrochloride Infusion Solution 0.1% w/v should not be mixed with other drugs unless compatibility is known. The pH range is 4.0 to 6.5.

The solution must not be stored in contact with metal e.g. needles or metal parts of syringes as dissolved metal ions may cause swelling at site of the injection.

6.3 Shelf life

2 years

6.4 Special precautions for storage

Do not store above 25°C

6.5 Nature and contents of container

100ml or 250ml polypropylene infusion bags in packs of 10 and 5 respectively .

Not all pack sizes may be marketed.

6.6 Special precautions for disposal

The infusion is for single patient use and should be used immediately after opening. Any unused portion should be discarded.

Bupivacaine Hydrochloride Infusion Solution has been demonstrated to be compatible with fentanyl 2 micrograms/ml, 5 micrograms/ml and 10 micrograms/ml for 48 hours at 25°C and 2 - 8°C.

From a microbiological point of view, the product should be used immediately. If not used immediately, in-use storage times and conditions are the responsibility of the user and would normally not be longer than 24 hours at 2 - 8°C, unless dilution has taken place in controlled and validated aseptic conditions.

7 MARKETING AUTHORISATION HOLDER

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GU15 3YL
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8 MARKETING AUTHORISATION NUMBER(S)

PL 04416/1731

**9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE
AUTHORISATION**

09/03/2000 / 29/09/2005

10 DATE OF REVISION OF THE TEXT

08/05/2024