

## **Lidocaine Hydrochloride Injection 1% w/v and 2%w/v**

### **1. Name of the medicinal product**

Lidocaine Hydrochloride Injection 1% w/v Taj Pharma.

Lidocaine Hydrochloride Injection 2%w/v Taj Pharma.

### **2. Qualitative and quantitative composition**

For 1% :-

Each 5 ml solution contains 50mg Lidocaine Hydrochloride

Each 10 ml solution contains 100mg Lidocaine Hydrochloride

Each 20 ml solution contains 200mg Lidocaine Hydrochloride

For 2% :-

Each 5 ml solution contains 100mg Lidocaine Hydrochloride

Each 10 ml solution contains 200mg Lidocaine Hydrochloride

Each 20 ml solution contains 400mg Lidocaine Hydrochloride

For the full list of excipients, see section 6.1

### **3. Pharmaceutical form**

Solution for Injection.

Clear and colourless solution.

### **4. Clinical particulars**

#### **4.1 Therapeutic indications**

Suppression of ventricular extrasystoles and ventricular tachycardia, especially after an acute myocardial infarction.

Local anaesthesia by surface infiltration, regional, epidural and caudal routes, dental anaesthesia, either alone or in combination with adrenaline.

Lidocaine may also be administered by subcutaneous, intramuscular or intravenous injection.

Not intended for use in the eye.

#### **4.2 Posology and method of administration**

##### **In ventricular arrhythmias**

The usual adult IV bolus dose is 50-100mg administered at a rate of approximately 25-50mg per minute. If the desired response is not achieved, a second dose may be administered 5 minutes after completion of the first injection. Not more than 200-300mg should be administered during a one hour period. Elderly patients and those with congestive heart failure or cardiogenic shock may require smaller bolus doses.

Maintenance infusion of a 0.2 or 0.4% solution in 5% glucose.

Adults: 20-50 micrograms/kg/minute (1-4mg/minute in an average 70 kg adult).

Slower infusion rates should be used in patients with congestive heart failure or liver disease; no dosing modification appears necessary in patients with renal failure. When arrhythmias reappear

during a constant infusion of Lidocaine, a small bolus may be given to rapidly increase plasma concentration of the drug; the infusion rate is increased simultaneously. The infusion should be terminated as soon as the patient's basic cardiac rhythm appears to be stable or at the earliest sign of toxicity.

Infants and children may be given an initial IV bolus of 0.5-1mg/kg. This dose may be repeated according to the response of the patient, but the total dose should not exceed 3-5mg/kg. A maintenance IV infusion of 10-50 micrograms/kg per minute may be given via an infusion pump.

For advanced cardiac life support in children, the recommended dosage is an initial IV bolus of 1mg/kg. If ventricular tachycardia or ventricular fibrillation is not corrected following defibrillation and an initial bolus, an IV infusion should be started at a rate of 20-50 mcg/kg per minute.

Constant ECG monitoring is recommended during therapy with Lidocaine Hydrochloride, however if this equipment is not available and a ventricular arrhythmia is suspected, a single IM dose may be administered if bradycardia is not present. The deltoid muscle is the preferred site for IM injection.

### **In Local Anaesthesia**

Usual doses should generally be reduced in children and in elderly or debilitated patients. To minimise the possibility of toxic reactions, children should be given Lidocaine Hydrochloride solutions in concentrations of 0.5% or 1%.

Single doses of Lidocaine (for anaesthesia other than spinal) should not exceed 4.5mg/kg (or 200mg) in adults or children 12 – 18 years of age. Lidocaine by local infiltration for children under the age of 12 years should not exceed 3mg/kg, repeated not more often than every 4 hours.

For spinal anaesthesia, up to 100mg of the drug may be given. For continuous epidural or caudal anaesthesia, the maximum dose should not be repeated at intervals of less than 1.5 hours. For paracervical block for obstetric analgesia (including abortion) the maximum recommended dosage (200mg) should not be repeated at intervals of less than 1.5 hours. For IV regional anaesthesia in adults using a 0.5% solution, the dose administered should not exceed 4mg/kg.

Solutions of 1% Lidocaine Hydrochloride (without preservative) are used for epidural or caudal anaesthesia. To prevent intravascular or subarachnoid injection of a large epidural dose of Lidocaine, a test dose of 2-5 mls should be injected at least 5 minutes prior to administering the total dose.

In epidural anaesthesia 2-3 mls of 1% solution is usually required for each dermatome to be anaesthetised.

In caudal block for production of obstetric analgesia or in epidural thoracic block, 20-30 mls of a 1% solution (200-300mg) of the drug may be used. For epidural lumbar anaesthesia, the dose is 25-30 mls (250-300mg) of a 1% solution.

For intercostal nerve block: 3 mls of a 1% solution (30mg).

For paravertebral nerve block: 3-5 mls of a 1% solution (30-50mg).

For pudendal nerve block (each side): 10 mls of a 1% solution (100mg).

For paracervical nerve block (each side) for obstetric analgesia: 10 mls of a 1% solution (100mg).

For sympathetic nerve blocks: Cervical (stellate ganglion) nerve block: 5 mls of a 1% solution (50mg).

Lumbar nerve block: 5-10 mls of a 1% solution (50-100mg).

For percutaneous infiltration anaesthesia: 1-60 mls of a 0.5% solution or 0.5 to 30ml of a 1% solution (5-300mg).

For IV regional anaesthesia: 10-60 mls of 0.5% solution (50-300mg).

#### **4.3 Contraindications**

Known hypersensitivity to lidocaine or other anaesthetics of the amide type.

In ventricular arrhythmia

- Sino-atrial disorders
- All grades of atrioventricular block
- Severe myocardial depression
- Porphyria (use with caution in local anaesthesia)

Local anaesthesia

- Complete heart block

- Hypovolaemia

#### **4.4 Special warnings and precautions for use**

As with other local anaesthetics, Lidocaine should be used with caution in patients with epilepsy, myasthenia gravis, cardiac conduction disturbances, (see also section 4.3), congestive heart failure, bradycardia, severe shock, impaired respiratory function or impaired renal function with a creatinine clearance of less than 10mL/minute. Lidocaine is metabolised in the liver and it should be used with caution in patients with impaired hepatic function. Lower doses should be used in congestive cardiac failure and following cardiac surgery (See 4.2 Posology).

Hypokalaemia, hypoxia and disorders of acid-base balance should be corrected before treatment with intravenous lidocaine begins.

Facilities for resuscitation should be available when administering local anaesthetics.

The effect of local anaesthetics may be reduced if the injection is made into an inflamed or infected area.

Intra-articular administration of lidocaine may cause chondrotoxicity.

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

- Central nerve blocks may cause cardiovascular depression, especially in the presence of hypovolaemia, and therefore epidural

anaesthesia should be used with caution in patients with impaired cardiovascular function.

- Blood pressure should be monitored during spinal anaesthesia. Epidural anaesthesia may lead to hypotension and bradycardia. This risk can be reduced by preloading the circulation with crystalloidal or colloidal solutions. Hypotension should be treated promptly.
- Paracervical block can sometimes cause foetal bradycardia or tachycardia, and careful monitoring of the foetal heart rate is necessary
- Injections in the head and neck regions may be made inadvertently into an artery, causing cerebral symptoms even at low doses.
- Retrobulbar injections may rarely reach the cranial subarachnoid space, causing serious/severe reactions, including cardiovascular collapse, apnoea, convulsions and temporary blindness
- Retro- and peribulbar injections of local anaesthetics carry a low risk of persistent ocular motor 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.

Intramuscular Lidocaine may increase creatinine phosphokinase concentrations which can interfere with the diagnosis of acute myocardial infarction. Lidocaine has been shown to be

porphyrinogenic in animals and should be avoided in persons suffering from porphyria.

Hameln Lidocaine Injection is not recommended for use in neonates. The optimum serum concentration of lidocaine required to avoid toxicity, such as convulsions and cardiac arrhythmias, in this age group is not known.

#### **4.5 Interaction with other medicinal products and other forms of interaction**

##### Effects of Lidocaine on other medicinal products

Lidocaine should be used with caution in patients receiving other local anaesthetics or agents structurally related to amide-type local anaesthetics (e.g. anti-arrhythmics, such as mexiletine), since the systemic toxic effects are additive. Specific interaction studies with lidocaine and class III anti-arrhythmic drugs (e.g. amiodarone) have not been performed, but caution is advised.

There may be an increased risk of enhanced and prolonged neuromuscular blockade in patients treated concurrently with muscle relaxants (e.g. suxamethonium).

##### Effects of other medicinal products on Lidocaine

The clearance of Lidocaine may be reduced by beta-adrenoceptor blocking agents (e.g. propranolol) and by cimetidine, requiring a reduction in the dosage of lidocaine. Increase in serum levels of lidocaine may also occur with anti-viral agents (e.g. amprenavir, atazanavir, darunavir, lopinavir).

There may be an increased risk of ventricular arrhythmia in patients treated concurrently with antipsychotics which prolong or may prolong the QT interval (e.g. pimozide, sertindole, olanzapine, quetiapine, zotepine), or 5HT<sub>3</sub> antagonists (e.g. tropisetron, dolasetron).

While adrenaline (epinephrine) when used in conjunction with lidocaine might decrease vascular absorption, it greatly increases the danger of ventricular tachycardia and fibrillation if accidentally injected intravenously.

Cardiovascular collapse has been reported following the use of bupivacaine in patients on treatment with verapamil and timolol; Lidocaine is closely related to bupivacaine.

Concomitant use of quinupristin/dalfopristin should be avoided.

Hypokalaemia produced by acetazolamide, loop diuretics and thiazides may antagonize the effect of lidocaine if administered concomitantly (see section 4.4).

Inhibition of CYP1A2 by fluvoxamine considerably reduces elimination of lidocaine and increases the risk of lidocaine toxicity. Concomitant use of both fluvoxamine and a CYP3A4 inhibitor such as erythromycin can further increase lidocaine concentrations. Because lidocaine possesses a narrow therapeutic window, doses of lidocaine may need to be adjusted accordingly. Conversely, reduced serum lidocaine concentrations may result from drugs that may stimulate the hepatic metabolism of lidocaine (e.g. phenytoin, oral HRT).

Narcotics are probably proconvulsants and this would support the evidence that lidocaine reduces the seizure threshold to fentanyl in man.

Opioid-antiemetic combination sometimes used for sedation in children could reduce the convulsant threshold to lidocaine and increase the CNS depressant effect.

Lidocaine is markedly bound to  $\alpha$ -1-acid glycoprotein (AAG). AAG concentrations may be reduced by oestrogens leading to a higher free fraction of lidocaine in women than in men and the free fraction is further increased during pregnancy and in women taking oral contraceptives or HRT.

#### **4.6 Fertility, pregnancy and lactation**

##### *Pregnancy*

Although animal studies have revealed no evidence of harm to the foetus, Lidocaine crosses the placenta and should not be administered during early pregnancy unless the benefits are considered to outweigh the risks.

Lidocaine given by epidural or paracervical block, especially in large doses, or by local perineal infiltration prior to delivery crosses rapidly into the foetal circulation. Elevated lidocaine levels may persist in the newborn for at least 48 hours after delivery. Foetal bradycardia or neonatal bradycardia, hypotonia or respiratory depression may occur.

##### *Lactation*

Small amounts of Lidocaine are secreted into breast milk and the possibility of an allergic reaction in the infant, albeit remote, should be borne in mind when using Lidocaine in nursing mothers.

#### **4.7 Effects on ability to drive and use machines**

When outpatient anaesthesia affects areas of the body involved in driving or operating machinery, patients should be advised to avoid these activities until normal function is fully restored.

#### **4.8 Undesirable effects**

In common with other local anaesthetics, adverse reactions to Lidocaine are rare and are usually the result of raised plasma concentrations due to accidental intravascular injection, excessive dosage or rapid absorption from highly vascular areas, or may result from a hypersensitivity, idiosyncrasy or diminished tolerance on the part of the patient. Systemic toxicity mainly involves the central nervous system and/or the cardiovascular system (see also 4.9 Overdose).

Following regional blockade as when lidocaine is injected intrathecally or extradurally, hypotension, hypoventilation, Horner's Syndrome and hypoglycaemia may be seen. The degree of these effects will depend on the dose and the height of the block. Urinary retention may occur following sacral or lumbar epidural block. It should not outlast the duration of the block. Apnoea and hemiparesis may occur following stellate ganglion block. The probable cause is a direct injection of lidocaine into the vertebral or carotid arteries.

#### Immune system disorders

Hypersensitivity reactions (allergic or anaphylactoid reactions, anaphylactic shock) – see also Skin & subcutaneous tissue disorders

Skin testing for allergy to Lidocaine is not considered to be reliable.

#### Nervous & Psychiatric disorders

Neurological signs of systemic toxicity include dizziness or light-headedness, nervousness, tremor, circumoral paraesthesia, tongue numbness, drowsiness, convulsions, coma.

Nervous system reactions may be excitatory and or depressant. Signs of CNS stimulation may be brief, or may not occur at all, so that the first signs of toxicity may be confusion and drowsiness, followed by coma and respiratory failure.

Neurological complications of spinal anaesthesia include transient neurological symptoms such as pain of the lower back, buttock and legs. These symptoms usually develop within twenty-four hours of anaesthesia and resolve within a few days. Isolated cases of arachnoiditis or cauda equina syndrome, with persistent paraesthesia, bowel and urinary dysfunction, or lower limb paralysis have been reported following spinal anaesthesia with lidocaine and other similar agents. The majority of cases have been associated with hyperbaric concentrations of lidocaine or prolonged spinal infusion.

#### Eye disorders

Blurred vision, diplopia and transient amaurosis may be signs of lidocaine toxicity.

Bilateral amaurosis may also be a consequence of accidental injection of the optic nerve sheath during ocular procedures. Orbital inflammation and diplopia have been reported following retro- or peribulbar anaesthesia (see section 4.4 Special warnings and precautions for use).

#### Ear and labyrinth disorders

Tinnitus, hyperacusis

#### Cardiac and vascular disorders

Cardiovascular reactions are depressant and may manifest as hypotension, bradycardia, myocardial depression, cardiac arrhythmias and possibly cardiac arrest or circulatory collapse.

Hypotension may accompany spinal and epidural anaesthesia. Isolated cases of bradycardia and cardiac arrest have also been reported.

#### Respiratory, thoracic or mediastinal disorders

Dyspnoea, bronchospasm, respiratory depression, respiratory arrest

#### Gastrointestinal disorders

Nausea, vomiting

#### Skin & subcutaneous tissue disorders

Rash, urticaria, oedema (including angioedema, face oedema)

#### Blood and the lymphatic system disorders

Methaemoglobinaemia.

#### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation 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 at: [www.mhra.gov.uk/yellowcard](http://www.mhra.gov.uk/yellowcard).

#### **4.9 Overdose**

##### Symptoms of acute systemic toxicity

Central nervous system toxicity presents with symptoms of increasing severity. Patients may present initially with circumoral paraesthesia, numbness of the tongue, light-headedness, hyperacusis and tinnitus. Visual disturbance and muscular tremors or muscle twitching 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 hypercapnia occur rapidly following convulsions due to increased muscular activity, together with the interference with normal respiration and loss of the airway. In severe cases, apnoea may occur. Acidosis increases the toxic effects of local anaesthetics.

Effects on the cardiovascular system may be seen in severe cases. Hypotension, bradycardia, arrhythmia and cardiac arrest may occur as a result of high systemic concentrations, with potentially fatal outcome.

Recovery occurs as a consequence of redistribution of the local anaesthetic drug from the central nervous system, and metabolism and may be rapid unless large amounts of the drug have been injected.

#### Treatment of acute toxicity

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

Treatment will be required if convulsions and CNS depression occurs. The objectives of treatment are to maintain oxygenation, stop the convulsions and support the circulation. A patent airway should be established and oxygen should be administered, together with assisted ventilation (mask and bag) if necessary. The circulation should be maintained with infusions of plasma or intravenous fluids. Where further supportive treatment of circulatory depression is required, use of a vasopressor agent may be considered although this involves a risk of central nervous system excitation. If the convulsions do not stop spontaneously in 15-20 seconds, they may be controlled by the intravenous administration of Diazepam or Thiopentone Sodium, bearing in mind that anti-convulsant drugs may also depress respiration and the circulation. Prolonged convulsions may jeopardise the patient's ventilation and oxygenation and early endotracheal intubation should be considered. If cardiac arrest should occur, standard cardiopulmonary resuscitation procedures should be instituted. Continual optimal oxygenation and ventilation and circulatory support as well as treatment of acidosis are of vital importance.

Dialysis is of negligible value in the treatment of acute overdosage with Lidocaine

## **5. Pharmacological properties**

### **5.1 Pharmacodynamic properties**

Lidocaine is a local anaesthetic of the amide type. It is used to provide local anaesthesia by nerve blockade at various sites in the body and in the ionic control of dysrhythmias. It acts by inhibiting the ionic reflexes required for the initiation and conduction of impulses, thereby stabilising the neuronal membrane. In addition to blocking conduction in nerve axons in the peripheral nervous system, Lidocaine has important effects on the central nervous system and cardiovascular system. After absorption Lidocaine may cause stimulation of the CNS followed by depression and in the cardiovascular system, it acts primarily on the myocardium where it may produce decreases in electrical excitability, conduction rate and force of contraction. It has a rapid onset of action (about one minute following intravenous injection and fifteen minutes following intramuscular injection) and rapidly spreads through the surrounding tissues. The effect lasts about ten to twenty minutes and about sixty to ninety minutes following intravenous and intramuscular injection respectively.

### **5.2 Pharmacokinetic properties**

Lidocaine is absorbed from injection sites including muscle and its rate of absorption is determined by factors such as the site of administration and the tissue vascularity. Except for intravascular administration, the highest blood levels occur following intercostal



nerve block and the lowest after subcutaneous administration. Lidocaine is bound to plasma proteins, including alpha-1-acid-glycoprotein. The drug crosses the blood brain and placental barriers.

Lidocaine is metabolised in the liver and about 90% of a given dose undergoes N-dealkylation to form monoethylglycinexylidide and glycinexylidide, both of which may contribute to the therapeutic and toxic effects of Lidocaine. Further metabolism occurs and metabolites are excreted in the urine with less than 10% of unchanged Lidocaine. The elimination half life of Lidocaine following an intravenous bolus injection is one to two hours, but this may be prolonged in patients with hepatic dysfunction.

### **5.3 Preclinical safety data**

Not applicable.

## **6. Pharmaceutical particulars**

### **6.1 List of excipients**

Water for Injections E.P.

1N Hydrochloric Acid QS

1N Sodium Hydroxide QS (the maximum allowed is 1% )

### **6.2 Incompatibilities**

Lidocaine caused precipitation of Amphotericin, Methohexitone Sodium and Sulfadiazine Sodium in Glucose Injection. It is recommended that admixtures of Lidocaine & Glyceryl trinitrate should be avoided.

### **6.3 Shelf life**

36 months.

### **6.4 Special precautions for storage**

Store at less than 25°C.

Protect from light.

### **6.5 Nature and contents of container**

Clear glass ampoule, glass type 1, E.P.

Pack sizes 2,5,10 and 20ml ampoules. Batch size 10 ampoules per carton.

### **6.6 Special precautions for disposal and other handling**

Not applicable.

## **7. Manufactured By:**

**Taj Pharmaceuticals Ltd.**

at: Plot. No. 220, Mahagujarat

Industrial Estate, At & Post-Moraiya,

Tal-Sanand, Dist- Ahmedabad Gujarat (India)