We don't know; better to err on the safe side from mid-gestation

Vivette Glover, Nicholas Fisk

Some scientists argue that fetuses cannot feel pain.¹ Indeed, fetuses are currently treated as though they cannot. By contrast, it is generally agreed that preterm babies—often of the same gestational age as fetuses—should be given analgesia.^{2,3} In the public arena the pro-life and pro-choice lobbies often adopt opposed stances on the issue. However, attitudes to abortion should not influence our assessment of the evidence.

Currently we have no direct way of assessing pain in fetuses. The most rational approach is to make an informed guess based on our knowledge of the development and function of the nervous system at different gestational ages.⁴ Studies indicate that cortical, subcortical, and peripheral centres necessary for pain perception begin developing early in the second trimester.^{2,4} From 14 weeks most of the body responds to touch by moving away,⁵ but this is probably a subcortical reflex response. To experience anything, including pain, the subject needs to be conscious, and current evidence suggests that this involves activity in the cerebral cortex and possibly the thalamus.⁶ We do not know for sure when or even if the fetus becomes conscious. However, temporary thalamocortical connections start to form at about 17 weeks and become established from 26 weeks.⁴ It seems very likely that a fetus can feel pain from that stage.

Measuring indices of trauma

Pain is a complex phenomenon which can include feeling, suffering, and learning.⁷ However, even if the nature of the experience changes with development¹ this does not prove that immature humans cannot be distressed by pain. There may also be suffering associated with acute stress, independent of pain.

Though we cannot measure pain, we can measure fetal hormonal stress responses, which occur from at least 23 weeks of gestation.⁸ As in neonates these can be used to show the degree of trauma caused by different types of intervention. If used at a stage when it is reasonable to presume that the fetus may feel pain they seem the best indices currently available.⁹ A further index of acute stress in fetuses is blood flow redistribution to the brain, as shown by Doppler studies of human fetuses from 18 weeks undergoing invasive procedures.¹⁰

The fetus may be subjected to different kinds of stress or pain during invasive procedures, termination, and even birth. Fetal surgical interventions, though rare, are increasingly used for lifesaving operations such as shunt insertions. Usually these are done in older fetuses, which are more likely to feel pain. Operative delivery with forceps or vacuum is quite common. Though much attention is given to pain relief for the mother

during labour and delivery, little is given to the question of the baby's experience. This deserves more attention.

There are two reasons for considering giving analgesia to fetuses: to prevent possible immediate suffering and to avoid the risk of long term effects. Much evidence from animal studies suggests that acute stress to fetuses or neonates can have permanent behavioural consequences.¹¹ We do not know whether there are such effects on human development, though neonatal circumcision increases pain responses six months later.¹²

The question of pain or suffering during termination of pregnancy is especially difficult. Terminations are usually carried out before 20 weeks, when it is particularly uncertain whether the fetus feels anything at all. It may feel something, however, especially towards mid-gestation. Hence until there is evidence to the contrary those conducting later terminations should try to use methods that are likely to cause as little suffering as possible. This must be balanced against the distress to the mother caused by the method used.¹³

There are technical problems in delivering analgesia to fetuses. Methods need to be developed which give safe access but which do not have adverse pharmacological effects on the mother. Except in terminations we must not risk miscarriage or fetal death. We need research to determine whether the humane care given to preterm babies can now be extended to fetuses.

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Probably no pain in the absence of "self"

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What happens if I am stung by a wasp? The first thing is a complex reaction in my body which results in the feeling of sharp pain and my violent reaction to the wasp. The pain is, of course, a specific subjective, qualitative feeling but it would not be possible unless there was a body (organism) which was exposed and reacted to the noxious stimulus. Thus pain has a dual nature. As a subjective, conscious feeling it is always *my* pain happening inside or on my body and nobody else can experience it. As an objective bodily, neurophysiological

phenomenon it can be described and explained in the objective language of science.

Objectivity, subjectivity, and "self"

The distinction implies several fundamental questions: what is the relation between the objective and subjective aspects of pain? Do the neurophysiological processes in the brain (neurone firings) cause the feeling of pain or are they identical with it? Is it at all possible to

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reduce subjective and objective aspects of pain to the common denominator? If we accept the first possibility—that there is a causal relation between physical and mental processes in the brain—then it is possible to have a perfect description of the neurophysiological mechanism of the fetus and yet not know what it is like to be a fetus.^{1 2} If we choose the second option we can argue that ascertaining some specific neurophysiological event is identical with ascertaining pain. So we could argue that the fetus is in pain because the pain can be detected through physiological changes in its body such as increase in heart rate, release of hormones and other substances, etc.

What happens if a dog is stung by a wasp? Certainly there is a complex reaction in its body, probably similar to the physiological processes in my body, and a frantic reaction of screaming, whining, or whimpering. For many people (including some philosophers) this behaviour is conclusive proof that the dog is in pain. I also am ready to accept that conclusion. But I am still dubious about what happens between the stimulus and the behavioural reaction of the dog. Even if we admit that some animals have a conscious experience of the world around them it is still problematic whether they can be subjects of their own conscious experiences—that is, whether they can reflect on their own experiences. Though the behaviour of the dog suggests that it is in pain, I cannot say if its relation to its pain is exactly the same as mine. I do not know if the dog is conscious of its

body and can identify, reflect upon, and control its pain. I do not know if there is any self in the dog.

What happens if in the course of amniocentesis a fetus is accidentally pricked by the needle? If the fetus is in the 30th week of pregnancy it perhaps feels some pain. But what if it is in the ninth or 10th week? Even if we could decide precisely when a capacity to feel pain emerges (and it is no doubt related to the level of development of the brain and nervous system) we would still have a problem with defining the ontological status of the fetal pain. Is it more like the animal pain or is it more like the human conscious, subjective, qualitative pain? I do not think we can experience pain unless we are aware of ourselves and our own bodies. On the other hand, if we admit to a possibility of unconscious mental events or unconscious pain³ we can argue that there is a moment in fetal development when the fetus begins to react to noxious stimuli signalled by its neurophysiological system even though no self is yet present. The moral and clinical consequences of that fact are different and highly controversial.^{4 5}

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Reflex responses do not necessarily signify pain

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Can a fetus feel pain? This question is appropriate, as medical interventions during pregnancy,¹ fetal surgery,² and possibly termination of pregnancy expose the fetus to noxious stimuli. To answer the question we need definitions of "feeling" and "pain." The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage" and goes on to emphasise the importance of experience related to past injury. To feel something is defined as "to have the emotions excited, to experience a sensation." These definitions imply that the brain must achieve a certain level of neural functioning, as well as having prior experience, before pain can be understood.

Neural maturation of any brain region includes so many stages and events that it is inadequate to use the presence or absence of any one event as evidence of functioning, but a critical factor must be the arrival of thalamocortical connections. These first penetrate the frontal cortical plate at 22-34 weeks,³ and their arrival correlates well with evoked potential studies, which show that the distinct component signalling the arrival of sensory impulses at a cortical level cannot be detected before 29 weeks.⁴

Role of sensory processing at lower levels

But is it appropriate in fetal and neonatal medicine to concentrate on the conscious perception of pain? Instead, should we not consider the neuronal activity that noxious stimulation produces in the pathways and nuclei concerned in sensory processing at lower levels of the central nervous system?

The development of the human spinal cord is a highly orchestrated process in which neurone and glial specific genes are induced in a manner closely similar to that in experimental animals.⁵ It becomes functional early in fetal life, and reflex movements to somatic stimuli can

be evoked between 7.5 and 14 weeks while at the same time the fetus begins to move spontaneously in the absence of any obvious external stimulation. It is important to emphasise the reflex nature of these movements even though they may involve extensive body regions and therefore intersegmental and brain stem connections. They occur (in abnormal patterns) in anencephalic fetuses at 16-35 weeks even when only parts of the spinal cord are intact.⁶

Early reflexes are evoked by tactile stimulation or light pressure and are not necessarily nociceptive. In fact, small diameter afferent nerve fibres known to subserve nociception have not penetrated the fetal spinal cord at 19 weeks.⁷ However, by 26 weeks even very low birthweight infants show a clear and measurable flexion withdrawal reflex to noxious stimulation, suggesting that nociceptive afferent input to the spinal cord is present.⁸ Though these studies were carried out after birth, it is reasonable to assume that such responses would also occur in utero.

These cutaneous reflexes are exaggerated compared with those in adults, with lower thresholds and more synchronised and longer lasting reflex muscle contractions. Though providing important information on how the immature nervous system reacts to noxious stimulation, they cannot be equated with true pain experience, which must involve the cortex and develop postnatally along with memory, anxiety, and other cognitive brain functions. In other words, stronger reflexes are likely to reflect the absence of the normal inhibitory control or "dampening" influences that higher brain structures normally exert at more mature stages.⁹ Exaggerated reflex response to noxious stimulation may be protective to an organism which (by virtue of cortical immaturity or malfunction) is unable to perceive and organise a more directed response to the pain.

In addition to spinal reflexes, infants delivered at 26-31 weeks show coordinated facial actions in

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