

INTRODUCTION

**Asthma is now considered to be
the most
common pulmonary condition
found in
pregnancy, in fact it is now
thought to**

INTRODUCTION

**be the most common medical
condition
found in pregnancy. It occurs
in 5 – 8%
of all pregnancies.**

INTRODUCTION

**As a relatively busy pulmonologist
I will always
have at least 3 or more pregnant
asthmatics
in the practice at one time, so it is a
condition with which
we should all be very familiar.**

INTRODUCTION

**I will review only specific aspects
about asthma
in pregnancy as the whole
subject is
too big to be reviewed in one
lecture.**

INTRODUCTION

**The topics to be discussed will
be very
clinically orientated.**

INTRODUCTION

1. Dyspnoea in pregnancy

INTRODUCTION

**2. Respiratory physiological changes
in pregnancy.**

INTRODUCTION

- 3. Cardiovascular physiological changes in pregnancy.**

INTRODUCTION

4. Effects of asthma on pregnancy.

INTRODUCTION

5. Effects of pregnancy on asthma.

INTRODUCTION

- 6. Review of the safety of medicines used in asthma.**

DYSPNOEA OF PREGNANCY

**60 – 70% of women experience
a sensation
of dyspnoea during
the course
of a pregnancy.**

DYSPNOEA OF PREGNANCY

**They frequently describe this as
“air hunger”.**

**This symptom commonly starts during
the 1st or
2nd trimester, the frequency rises
during the
2nd trimester and is reasonably stable
during the 3rd trimester.**

DYSPNOEA OF PREGNANCY

Dyspnoea of pregnancy is usually worse when a pregnant patient is in the sitting position and it is not associated with exercise.

DYSPNOEA OF **PREGNANCY**

**The mechanism of dyspnoea during
normal
pregnancy is not entirely
clear.**

DYSPNOEA OF **PREGNANCY**

It occurs while the uterus is still relatively small, thus is cannot be attributed solely to an increase in abdominal girth or pressure.

DYSPNOEA OF **PREGNANCY**

Progesterone induced hyper-ventilation
is thought to be partially responsible,
perhaps due
to the increase in ventilation above the
level needed
to meet the rise in metabolic demand.

DYSPNOEA OF **PREGNANCY**

**Clinical observations are
consistent
with this hypothesis.**

DYSPNOEA OF **PREGNANCY**

In one observational study the presence of dyspnoea during pregnancy correlated with a low PCO₂ and the women most likely to experience dyspnoea were those who had relatively high baseline values for PCO₂ while in the non pregnant state.

DYSPNOEA OF **PREGNANCY**

**When a pregnant women complains of
dyspnoea,
distinguishing between underlying
disease and
progesterone induced hyper-
ventilation
can be a difficult diagnostic
problem.**

10 IMPORTANT POINTS

- 1. Dyspnoea of pregnancy
is always
gradual in onset.**

10 IMPORTANT POINTS

**2. The patients are never
tachypnoeic.**

10 IMPORTANT POINTS

3. They never have pain.

10 IMPORTANT POINTS

**4. The heart rate may be
increased
but usually not greater
than 100
beats per minute.**

10 IMPORTANT POINTS

5. These patients never cough.

10 IMPORTANT POINTS

6. These patients never wheeze.

10 IMPORTANT POINTS

7. There are no crepitations present.

10 IMPORTANT POINTS

8. There is no sputum production.

10 IMPORTANT POINTS

**9. There is no orthopnoea
or paroxysmal
nocturnal dyspnoea.**

10 IMPORTANT POINTS

10. There is no haemoptysis.

**If any of these features
are
present the diagnosis
of dyspnoea
of pregnancy cannot be
made.**

DIAGNOSTIC TOOLS

**1. Pulmonary function testing
can be
carried out very easily during
pregnancy and
should be the investigation
of choice.**

DIAGNOSTIC TOOLS

**Variability in the expiratory
flow volume
curve will quickly alert one
to asthma and
a decrease in the diffusional capacity
should also
alert you very quickly to serious
pathology.**

DIAGNOSTIC TOOLS

2. The amount of radiation exposure to the foetus from a chest radiograph is extremely small and not known to have adverse foetal consequences.

**Nevertheless chest radiography
during
pregnancy should only be
done when
there is a good medical reason
and obviously
appropriate shielding of the mother's
abdomen
must be used.**

DIAGNOSTIC TOOLS

**3. Radio nucleotide lung scanning
which uses
technetium labelled microaggregates
of albumin is thought
to pose little risk to the foetus but
again should only be
used when there is serious consideration of
pulmonary embolic disease.**

DIAGNOSTIC TOOLS

- 4. BNP levels are not affected by pregnancy with levels being less than 50 and a medium level about 20, thus BNP levels may become very helpful if there is a suspicion of ventricular dysfunction as the cause of dyspnoea.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**Pregnancy is normally associated
with a
compensated respiratory
alkalosis.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

Minute ventilation increases during pregnancy, presumably due to increased circulating levels of progesterone.

RESPIRATORY PHYSIOLOGICAL CHANGES IN PREGNANCY

**The increase in minute ventilation,
which exceeds
metabolic demands, lowers alveolar
and arterial
PCO₂ which simultaneously increases
alveolar and arterial PO₂.**

RESPIRATORY
PHYSIOLOGICAL CHANGES IN
PREGNANCY

**The resulting respiratory alkalosis
induces
secondary compensation
through
renal loss of bicarb.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**The lower PCO₂ is thought to
provide
a diffusion
gradient that may facilitate
the foetus's
ability to eliminate waste from
aerobic metabolism.**

RESPIRATORY PHYSIOLOGICAL CHANGES IN PREGNANCY

This compensated respiratory alkalosis is brought about by an increase in resting minute ventilation which rises slowly during the pregnancy and reaches about a 50% increase at term.

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**Interestingly the respiratory
rate remains
essentially unchanged but the
minute ventilation
is increased primarily by a much
larger
tidal volume.**

RESPIRATORY PHYSIOLOGICAL CHANGES IN PREGNANCY

This increase in ventilation is much greater than the corresponding elevation in oxygen consumption which is usually about 20% whereas the minute ventilation increases by nearly 50%.

RESPIRATORY PHYSIOLOGICAL CHANGES IN PREGNANCY

**This minute ventilation change
is thought
to be due to the increase in
progesterone
levels as progesterone is a known
stimulant of
respiration and respiratory drive.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**It's levels gradually increase from
approximately
25 ng per ml at 6 weeks to about
150ng
per ml at term.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**Airway function is preserved
during
pregnancy as reflected by
an unchanged
FEV1 and an unchanged
FEV1/FVC ratio.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**The maximum mid expiratory
flow rate
also doesn't change during
pregnancy.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**Functional residual capacity (FRC)
decreases
approximately 20% during the latter
half of pregnancy
due to a decrease in both expiratory
reserve
volume and residual volume.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

However vital capacity and total lung capacity don't seem to change at all but tidal volume increases.

RESPIRATORY PHYSIOLOGICAL CHANGES IN PREGNANCY

**These changes can be explained by
the fact that
the enlarging uterus causes the
diaphragm position
to rise about 4cm above it's usual
resting position.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

However diaphragmatic excursion during respiration is not impaired since chest wall mobility increases and there is flaring of the ribs thus TLC and vital capacity remain the same, FRC drops and tidal volume increases.

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

Minor changes which are of little clinical importance have been described in the diffusing capacity for carbon monoxide with a slight increase in the 1st trimester followed by a minor decrease thereafter.

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**It is important to re-emphasise here
that the arterial
PO₂ in the foetus is only about
1/3 to 1/4
the arterial PO₂ in the adult.**

RESPIRATORY PHYSIOLOGICAL CHANGES IN PREGNANCY

**The foetus normally thrives on this
low O₂ level
due to a number of compensations,
the most important
of which is the dissociation curve
of foetal haemoglobin.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**However it just emphasises the
point that
the most important medicine to
give pregnant asthmatics
is oxygen and this cannot be over-
emphasised.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**The foetus can compensate for hypoxia
in a number
of ways including redistribution of
circulation to
vital organs, decreased body
movements and
increasing tissue extraction.**

RESPIRATORY **PHYSIOLOGICAL CHANGES IN** **PREGNANCY**

**However once again there is no
substitute
for giving the mother oxygen.**

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN PREGNANCY

The most striking cardiovascular changes in pregnancy are an increase in blood volume and an increase in cardiac output.

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN PREGNANCY

**The blood volume starts to rise during
the 1st trimester
and eventually reaches a maximum that
is 40 – 50%
above the non pregnant blood
volume.**

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN PREGNANCY

**Because plasma volume increases
more than
red cell mass the haematocrit
generally
falls resulting in the physiological
“anaemia”
of pregnancy.**

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN PREGNANCY

**The cardiac output also starts to rise
in the 1st trimester
reaching a peak at about 32
weeks of
gestation, that is 30 – 50% above
baseline.**

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN PREGNANCY

The increase in cardiac output is initially due to a rise in stroke volume but the increase is maintained later in pregnancy by an increase in heart rate as stroke volume tends to fall during the 3rd trimester.

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN PREGNANCY

**A decrease in systemic vascular
resistance
accompanies the increase in cardiac
output.**

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN PREGNANCY

Blood pressure during pregnancy is often notable for a rise in pulse pressure due to an unchanged systolic pressure accompanied by a decrease in diastolic pressure.

EFFECTS OF ASTHMA ON PREGNANCY

**The available literature suggests that
asthma may
negatively impact on various aspects of
pregnancy
including peri-natal mortality and
several common
complications of pregnancy.**

EFFECTS OF ASTHMA ON **PREGNANCY**

**There have been many studies in this
field and
none of them have come up with any
really
definite findings.**

EFFECTS OF ASTHMA ON PREGNANCY

**The largest study evaluated the
outcome of
over 280 000 pregnancies, this was
published
in the American Journal of Respiratory
and Critical
care medicine in 2007.**

EFFECTS OF ASTHMA ON PREGNANCY

**The next one looked at almost
37 000 subjects
and was published in the Journal
of Epidemiology
in 2000, the authors being Canon et al.**

EFFECTS OF ASTHMA ON PREGNANCY

**A third one of 11 500 births
also showed
an increase in the complications
of pregnancy
with asthmatic women.**

EFFECTS OF ASTHMA ON PREGNANCY

**In summary there is a relatively
small but
significant increase in the
complications
of pregnancy in asthmatic women.**

EFFECTS OF ASTHMA ON PREGNANCY

**However neither the effect of pregnancy
on asthma
nor the effect of asthma on pregnancy
should be
considered a contra-indication to
pregnancy
for patients with asthma.**

EFFECTS OF ASTHMA ON **PREGNANCY**

**Adequate therapy and good asthma
control
minimise these complications.**

EFFECTS OF ASTHMA ON PREGNANCY

**In all 3 of these studies there
didn't seem
to be one common complication
which goes
to show that the real incidence is
not high at all.**

EFFECTS OF ASTHMA ON PREGNANCY

**Hypoxia is the direct consequence
of poorly controlled asthma,
and this
consequence of asthma does
definitely impair foetal oxygenation
and utero-placental blood flow.**

EFFECTS OF ASTHMA ON PREGNANCY

**The 3 most important features noted
were maternal
hypoxia, hypocapnoea and alkalosis,
all of which
can occur during an acute exacerbation
of asthma.**

EFFECTS OF ASTHMA ON PREGNANCY

**Diminished pulmonary function
during pregnancy
is associated with adverse peri-natal
outcomes and
one small study demonstrated that a
decrease in
maternal FEV1 was associated**

EFFECTS OF ASTHMA ON **PREGNANCY**

**with gestational hypertension
and pre-term
birth compared to those with
normal FEV1's.**

EFFECTS OF ASTHMA ON PREGNANCY

Another study showed a modest increase risk of congenital malformation in infants of asthmatic women experiencing an exacerbation during the 1st trimester as compared to infants of asthmatic mothers who never experience an exacerbation.

EFFECTS OF ASTHMA ON PREGNANCY

The factor associated with asthma that could influence pregnancy would be the polymorphism of the beta 2 adrenergic receptor as these could contribute both to asthma and pre-term labour.

EFFECTS OF ASTHMA ON **PREGNANCY**

**However the clinical significance of
this association
is at present unclear.**

EFFECTS OF ASTHMA ON **PREGNANCY**

Links between bronchial hyper-reactivity and uterine muscle hyper-reactivity resulting in pre-term labour as well as vascular hyper-reactivity resulting in pre-eclampsia have been reported in asthmatic women but the clinical significance of these associations is also unclear.

EFFECTS OF PREGNANCY **ON ASTHMA**

The clinical effect of pregnancy on asthma is variable and there have been many studies looking at this but it seems that one can divide it into 1/3s, in that 1/3 worsen during pregnancy, 1/3 improve and 1/3 remain unchanged.

ACUTE EXACERBATIONS

**Acute exacerbations occur in
about
33% of pregnant asthmatics.**

ACUTE EXACERBATIONS

**These exacerbations are not
uniformly
distributed over the course of
pregnancy.**

ACUTE EXACERBATIONS

**In one large observational study that
followed over
500 pregnant asthmatics
exacerbations
occurred most frequently during
weeks 17 – 24.**

ACUTE EXACERBATIONS

A similar study showed that the peak incidence of severe asthma was from weeks 14 – 24 and that the peak incidence of mild asthma was from weeks 25 – 32.

ACUTE EXACERBATIONS

The reason for this unequal distribution of asthma exacerbations is unclear but it has been proposed that many women may decrease or stop taking asthma medication shortly after becoming aware of the pregnancy,

ACUTE EXACERBATIONS

**and this may lead to subsequent
deterioration
of their asthma control, particularly
inadequate
use of cortico-steroids.**

ACUTE EXACERBATIONS

In one of the prospective studies mentioned, only 4% of women taking inhaled corticosteroids from the start of pregnancy developed an attack compared to 17% of women who were not taking steroids.

ACUTE EXACERBATIONS

**In multiple observational studies it has
now been shown
that asthma severity prior to pregnancy
is directly
related to asthma severity during
pregnancy.**

ACUTE EXACERBATIONS

**The advice here is obviously to try to
get your
asthmatics as well controlled as
possible but
particularly if they intend to fall
pregnant.**

ACUTE EXACERBATIONS

Also observed in these studies was that asthma was generally less severe during the last 4 weeks of pregnancy and that in those who improved the improvement was gradual as the pregnancy progressed.

ACUTE EXACERBATIONS

Substantial asthma symptoms were uncommon during labour and delivery, which I must say is a question frequently asked of me by my pregnant asthmatics about how will they handle labour and delivery.

ACUTE EXACERBATIONS

The course of asthma in successive pregnancies in an individual tends to be similar but there are many case reports of patients having a normal pregnancy, severe asthma with the next pregnancy and with the 3rd completely normal.

MEDICATIONS IN **PREGNANCY**

**Two important considerations
arise with
the use of any medication in
pregnancy.**

MEDICATIONS IN **PREGNANCY**

- 1. Are there any potential
adverse
effects of medication on the
developing foetus ?**

MEDICATIONS IN **PREGNANCY**

- 2. Does pregnancy alter the metabolism or bio-availability of the medication ?**

MEDICATIONS IN **PREGNANCY**

Information about potential adverse effects must be interpreted with an understanding that the baseline frequency of complications in pregnancy is relatively high even in the absence of asthma or other disorders.

MEDICATIONS IN **PREGNANCY**

**Congenital anomalies occur in 3 – 8%
of live born
infants, miscarriages in 20 – 25% of
clinically
diagnosed pregnancies and severe
mental
retardation in 1 – 2% of births.**

MEDICATIONS IN **PREGNANCY**

**There is a small but significant
increase in
complications in pregnancy in
asthmatic
women as mentioned
previously.**

MEDICATIONS IN PREGNANCY

**However this risk is directly
proportional
to the severity of the asthma,
therefore the
use of medicines is vitally important
in the
control of asthma.**

MEDICATIONS IN **PREGNANCY**

**Relatively few drugs have been
proven harmful
in pregnancy and less than 1 %
of congenital
malformations can be attributed
to drugs.**

POTENTIAL ADVERSE EFFECTS

**Potential adverse effects of
medications on
a developing foetus or on
maternal
and foetal physiology
include:**

POTENTIAL ADVERSE **EFFECTS**

- **Abortion**

POTENTIAL ADVERSE **EFFECTS**

2. Foetal death

POTENTIAL ADVERSE **EFFECTS**

**3. Congenital malformation
(especially 1st trimester exposure)**

POTENTIAL ADVERSE **EFFECTS**

4. Reduced foetal growth

POTENTIAL ADVERSE **EFFECTS**

- 5. Impaired functional developing organs,
especially the central nervous system.**

POTENTIAL ADVERSE **EFFECTS**

- 6. Effect on maternal or utero-placental vasculature or uterine smooth muscle.**

ASSESSING THE RISK OF MEDICATIONS

**The FDA has established 5 categories
to describe
a drug's potential for causing
adverse
effects during pregnancy.**

ASSESSING THE RISK OF MEDICATION

**They mandated that newly approved
drugs introduced
after November 1980 be classified into
one of these
categories in the package insert:**

ASSESSING THE RISK OF MEDICATION

CATEGORY A:

Controlled studies show no risk.

Obviously

**there are no adequate well controlled
studies in**

**pregnant women as they have never
been done**

and will most likely never be done.

ASSESSING THE RISK OF MEDICATION

CATEGORY B:

No evidence of risk in humans. These are animal studies that show no risk. These studies must have at least 2 animal models, one of which is not a rodent and these must all be negative.

ASSESSING THE RISK OF MEDICATION

CATEGORY C:

Risk cannot be ruled out. Here some of the animal studies may be positive for foetal risk however the potential benefits justify this potential risk.

ASSESSING THE RISK OF MEDICATION

CATEGORY D:

**Positive evidence of risk. Here
investigational
or post marketing data show risk to the
foetus but they
do say that in severe cases the
potential benefits
may out way the risk.**

ASSESSING THE RISK OF MEDICATION

CATEGORY X:

Contra-indicated in pregnancy.

**Here studies in animals and
investigational**

**post marketing reports have shown
foetal risk**

**which clearly outweighs any possible
benefit to the patient.**

ASSESSING THE RISK OF MEDICATION

Over the years increasing dissatisfaction has arisen regarding the clinical usefulness of these categories and the FDA is currently developing a new, more descriptive system of pregnancy labelling.

SHORT ACTING BETA- ADRENERGIC AGONISTS

**Turbutaline has a category
B whereas
Salbutamol has a category C.**

SHORT ACTING BETA- ADRENERGIC AGONISTS

**The only reason for this difference is that
the Swedes have
done extensive studies on patients that
used Turbutaline
and there is just more evidence for
Turbutaline but
at no stage does Salbutamol show any
adverse effects.**

SHORT ACTING BETA-ADRENERGIC AGONISTS

These short acting beta agonists may in fact have a very beneficial effect on the hypertension of pregnancy because they all have quite a marked effect on decreasing the diastolic pressure.

LONG ACTING BETA **AGONISTS**

**Salmeterol has been given a
category C
by the FDA. This is because
of its more
extensive use. Formoterol
is also
considered safe.**

EPINEPHRINE

Concern has been raised about the possibility that alpha adrenergic effect of epinephrine may cause vaso-constriction in the utero-placental circulation.

EPINEPHRINE

The working group on pregnancy and asthma recommended that epinephrine generally be avoided during pregnancy except in the setting of anaphylaxis and epinephrine is a category C.

GLUCO-CORTICOIDS

Because of the importance in the treatment of a variety of inflammatory conditions systemic glucocorticoids have been extensively examined during pregnancy.

GLUCO-CORTICOIDS

**In studies of asthma during pregnancy
in which
patients are symptomatic enough to
require oral
gluco-corticoids it is often difficult to
exclude an
adverse effect of the underlying disease
itself.**

GLUCO-CORTICOIDS

Data from animal studies in several species have suggested that high dose systemic steroids may lead to cleft palate.

GLUCO-CORTICOIDS

**Palatal closure is usually complete
by the 12th
week of pregnancy so potential risk
would be
limited to administration during the
1st trimester.**

GLUCO-CORTICOIDS

However, 6 cohort studies and then a meta-analysis of them showed a significant increased risk of oral clefts in infants where the mothers received oral gluco-corticoid treatment in the 1st trimester.

GLUCO-CORTICOIDS

**Pre-term birth and low birth weight has
been shown
to be definitely associated with women
that received
high dose oral steroids and systemic
steroids at
any time during the pregnancy.**

GLUCO-CORTICOIDS

**In contrast the safety data
on inhaled
gluco-corticoids are very
reassuring.**

GLUCO-CORTICOIDS

The safety of these medicines was best assessed by the Swedish study which used inhaled Budesamide during early pregnancy and the rate of congenital malformation was no different from that of the general population.

GLUCO-CORTICOIDS

**There was also no effect on foetal mortality,
gestational age or foetal growth
and hence
inhaled gluco-corticoids get a
category B rating.**

ANTI-CHOLINERGIC **AGENTS**

**Agents such as Atropine and
Glycopyrilate are
not often used but Ipratropium is very
commonly used
in this country in the nebulised
form.**

ANTI-CHOLINERGIC **AGENTS**

Studies here have shown no side effects at all and it is considered to be completely safe in pregnancy and is in category B.

METHYL-XANTHENES

**Extensive clinical experience suggests
that theophyllin
and its ethylene diamine complex,
Aminophyllin
are safe during pregnancy.**

METHYL-XANTHENES

They have been investigated extensively because there is definitely some change in metabolism and bio-availability during pregnancy.

METHYL-XANTHENES

**Due to its decrease in binding the
plasma levels
should be slightly lower than the
10 – 15mcg
normally recommended, it should be
between 8 – 12.**

METHYL-XANTHENES

**The 2nd change is the clearance of
Theophyllin
appears to decrease in the 3rd trimester
requiring a
reduction in the maintenance
dose.**

LEUCOTRINE **ANTAGONISTS**

The prospective controlled studies of the use of leucotrine antagonists showed that there was no increase in birth defects or adverse outcomes although these studies are small they are relatively convincing but bigger ones are required.

LEUCOTRINE **ANTAGONISTS**

**The animal data on these drugs
are very
reassuring as well.**

ANTI-HISTAMINICS

**The older anti-histaminics
were always
considered to be completely safe
purely because
they have been on the market such a
long time
and were used extensively with no
definitive adverse reports.**

ANTI-HISTAMINICS

**However the newer ones,
Loratidine
and Ceterizine are both
category B
and so are safe in pregnancy.**

DECONGESTION

Pseudo-effedrine has always been considered to be unsafe, however it is felt that topical Pseudo-effedrine, given as a nasal spray is safe and gets a category C whereas oral pseudo-effedrine has not been investigated is unlikely to be investigated.

CONCLUSION

**Thus in conclusion the majority
of medicines
that we use in the treatment of
asthma can
be used in the treatment of the
pregnant asthmatic.**

CONCLUSION

**The only one that should really be
carefully
assessed is large dose oral or systemic
steroids in
the 1st trimester of pregnancy.**

CONCLUSION

The big take home message here is to reassure the patient that the medicines are safe and more important to emphasise to the patient that the use of medications is of much more benefit to the foetus and mother than any possible side effects.

CONCLUSION

**I think this is imperative in
reassuring your patient
that the medicines are more
beneficial than a
tight chest with its resultant hypoxia.**