



The timing of vaccination with respect to anaesthesia and surgery

Main recommendations:

1. Surgery following immunisation with inactivated vaccines
 - Delay surgery 48 hours post vaccination to avoid post-vaccination symptoms causing diagnostic concern perioperatively.

2. Surgery following immunisation with live attenuated vaccines
 - No reason to delay if child well at time of immediate pre-operative assessment.

3. Vaccination after surgery
 - There is no contraindication to vaccination immediately after surgery, once the child is well and has recovered from the procedure.

4. Advice for pre-assessment
 - Continue with normal vaccination schedule, in line with the above recommendations.
 - For major surgery risk assessment should take into account risk of side effects of vaccination occurring when a prolonged post-operative recovery period is expected.

Introduction

Anaesthetists and surgeons are often faced with a child who has been recently immunized presenting for either emergency or elective surgery. The question is then raised as to whether the anaesthesia or the surgery will affect the immune response of the child to the vaccine, or more seriously whether the vaccine may cause more serious adverse reactions in these circumstances. A further question may be raised as to how soon after surgery would it be safe to administer vaccine. (1,2)

Since 1990 the "Recommendations on Immunisation against Infectious Diseases" compiled by the Joint Committee on Immunisation and Vaccination (3.) no longer lists proximity of anaesthesia as a general contraindication to any of the routine immunizations given to children in this country. This is still the 'Government' position.

Remit

These guidelines are intended to address two basic questions:

Should there be an interval between immunisation and elective surgery?

Should scheduled immunisation be delayed after a child has had either elective or emergency surgery?

Guideline exclusion – immunocompromised children.

Method

When considering the evidence we addressed the following specific questions: -

Question 1: Does recent immunisation Impact upon the outcome of surgery and anaesthesia in children?

Evidence

There is no evidence that recent vaccination increases risk of complications from surgery and anaesthesia.

The immune response to surgery and anaesthesia is well documented in the literature and involves changes in neutrophil, NK and lymphocyte number and function. However in those studies which show diminished responses, the effect is transient, and the magnitude of the effect would be extremely unlikely to affect clinical outcome in the normally immune competent child. (4.)

There is no evidence that there is any modification of immune function as a result of immunisation that has an impact on outcomes of either anaesthesia or surgery.

Sequelae of immunisation, such as fever, irritability, etc are well recognised and may complicate assessment of a child developing these symptoms in the perioperative period. (5.)

This is likely to happen in the first 24-48 hours after administration of inactivated vaccines, and up to 3 weeks after live vaccines such as MMR.

There is no evidence, that such side effects have an adverse effect on outcome. However if it is considered that these side effects may complicate the postoperative assessment of a child then there are grounds to delay the surgery if the vaccination has already been given. This is only likely to be an issue in the first 48 hours after administration of an inactivated vaccine, and may really only need to be considered when contemplating major procedures.

Alternatively, a routine vaccine can be delayed until after the surgery; as long as there is a mechanism to ensure that there is no undue delay thereafter.

If vaccination is delayed, the vaccine should be given, as soon as these risks have resolved, ideally prior to discharge.

Conclusion

Recent vaccination does not impact upon the outcome of surgery, but it may be wise to postpone elective surgery for 48 hours after inactivated vaccine administration in order to avoid diagnostic confusion should the child develop a post-vaccination pyrexia. This is only likely to be a real problem following major surgical procedures.

Question 2: Does surgery and anaesthesia affect the immune response to immunisation?

Evidence

There is no evidence that immunity acquired from vaccination is reduced in children receiving routine childhood immunisations before, during, or after surgery.

While depression in T cells numbers following surgery had been shown to be statistically significant in comparison to controls, we know from experience of immunisation of children with moderate T cell immunodeficiency, that good vaccine responses can be obtained, even with lymphocyte numbers and function at much lower levels than those observed in perioperative patients.

Reviews of the rare cases of vaccine preventable disease have not identified surgery as being a possible contributory factor to vaccine failure.

Studies of antibody responses to pneumococcal vaccination following splenectomy show a protective response even if given immediately after surgery.

There have been occasional case reports of vaccine failure in children when the vaccine was administered in the perioperative period, but a causal relationship has never been established (4)

Conclusion

There is no contraindication to vaccination immediately after surgery, once the child is well and has recovered from the procedure

Question 3: What is the risk of a vaccinated child developing symptoms before surgery that leads to cancellation?

Evidence

Following immunisation with inactivated vaccines 20% will develop fever, but this resolves within 48 hours.

Following immunisation with live attenuated vaccines, such as MMR, the incidence of fever after the first dose up to 6%, and usually occurs 5-10 days after the vaccine is given. Rarely fever can occur up to 21 days post-vaccination. Fever is rare following second doses (6)

It is important to be clear that the absolute risk of fever after vaccination is not necessarily the same as attributable risk. Febrile illnesses are common in infants (the average healthy child has eight infective episodes in first 18 months of life), so there is high likelihood of temporal relationship to vaccination (7,8)

Conclusion

The risk of developing fever in the first 48 hours after inactivated vaccines is high enough to significantly increase the risk of cancellation of the surgery. The risk of developing a fever following live attenuated vaccines is of the same order as the risk from common febrile illnesses of childhood, and so should not be considered as an indication to delay either vaccination or surgery.

Question 4: What are the risk and consequences if vaccination is postponed?

Evidence

Delay in completion of the primary immunisation schedule exposes pre-vaccinated and incompletely vaccinated infants to pertussis (9).

MMR uptake rates in some parts of UK are under those necessary to maintain herd immunity. Outbreaks of measles have occurred over recent years. Young children who have yet to be vaccinated form a group of individuals susceptible to infection, but also act as "pool" for ongoing transmission.

There may be considerable delays in catching up with the vaccination schedule, and a risk of non-completion if the vaccines scheduled for 12 and 13 months are not given at the appropriate time.

Conclusion

Delaying vaccination increases the risk of infection in the affected child, and has been shown to result in non-completion of the vaccination schedule in some children. The importance of completing the vaccination schedule both for the child and the community outweighs any concerns about the impact of vaccination upon surgery.

Question 5: Is there a risk from delaying surgery?

Evidence

This guideline only applies to elective surgery, so there should be no risks associated from delaying surgery.

In urgent and emergency surgery, the necessity of surgery over-rides any theoretical considerations, and recent immunisation should not affect management.

There is no evidence to support the need for additional booster vaccinations if the original vaccine is given at or around the time of emergency surgery.

Conclusion

Urgent or emergency surgery should never be delayed as a result of recent vaccination. Since the main recommendations of this guideline are to minimally delay elective surgery only after inactivated vaccines, there should be no risks as a result of delaying non-urgent surgery.

Question 6: Should vaccines be given opportunistically during anaesthetic procedures?

Evidence

There is no absolute contra-indication to this practice. However, in a child undergoing a surgical procedure, it may not be wise potentially to complicate the post-operative period by increasing the risk of fever and irritability.

In children who would not otherwise receive their vaccinations, or who are having non-surgical procedures under anaesthetic (e.g. imaging), the benefits of vaccination outweigh this risk.

A recent study has shown that prophylactic administration of paracetamol to reduce fever or febrile convulsions after vaccination in infants actually results in reduced immunogenicity and should not be routinely recommended (10).

Conclusion

In general vaccination should not be administered during anaesthesia, in order that paracetamol or other anti-inflammatory agents can be used freely as part of the anaesthetic technique and post-surgical care. If indicated vaccination should be given when the child has recovered, but before discharge. However if it is likely that vaccination will be omitted unless given under anaesthesia then this is acceptable practice.

Question 7: Is there a risk of virus transmission to other children

Concerns about transmission of virus to other children following oral polio vaccination can now be discounted, as this is no longer part of the UK immunisation schedule.

MMR does not carry the risk of virus transmission.

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Immunisation schedule

The schedule for routine immunisation is given below.

Vaccine	Age	Notes
D/T/P/Hib/IPV, + Prevenar 13	2months}	
D/T/P/Hib/IPV, + Men C	3months}	Primary course*
DTPHib IPV + Prevenar 13 + Men C	4months}	
Hib/MenC	12 months	
MMR + Prevenar 13	13 months	
DTp/IPV + MMR	3 years 4 months	
HPV vaccine	Girls age 12-13	3 doses at 0, 1, 6 months
dT/IPV	14 years	

Additional vaccines that may be offered to children at increased risk include:

BCG shortly after birth in infants or following negative Mantoux if identified later

Hepatitis B 0, 1 month, 2 month 12 months post exposure (including neonates)
OR at 0, 1, 6 months as prophylaxis, (including occupational risk)

Influenza: 2 doses, 1 month apart 1st year, annually thereafter

Varicella vaccine 2 doses 2 months apart (if seronegative over 13 years)