In this cost-minimization calculation, horizontal and vertical transmission of hepatitis B is each considered as being responsible for 50% of the carriers. The same graphic method may be used to find the point of cost indifference, if it is assumed that horizontal transmission is responsible for 66% of the carrier state and vertical transmission is responsible for 33%. The graph showing cost of universal immunization can be redrawn at half the present cost, as this will be the relative cost per carrier saved, compared to carrier saved by selective vaccination (Fig 1C). The new cost-indifference point can be re-estimated. Here universal immunization will be as cost-effective as selective immunization when the carrier rate is 1.1%. Similarly this point of cost indifference can be calculated for other ratios of horizontal to vertical transmission. The assumption, as in the rest of this paper, is that universal immunization starting at 6 weeks protects against all cases of horizontal transmission and selective immunization at birth protects against all cases of vertical transmission of hepatitis B.

Cost-minimization analysis is employed conventionally to compare costs when the effects of two interventions are identical. The study shows how this cost-minimization can be used even when the contribution of vertical and horizontal transmission to the carrier rate is different (and when the benefits of the two strategies are not identical), after a process of scaling down costs of one intervention, to the level were benefits are comparable. Fig 1C encroaches into the territory of cost-effectiveness studies.

We believe the form of calculation we have adopted has not been utilized before. This novel application of cost-minimization can be used to determine the carrier rate where one strategy for immunization would be preferred over the other in a wide variety of conditions.

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References

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Umbilical metastasis with squamous cell carcinoma of esophagus

Umbilical metastasis is usually seen with disseminated adenocarcinomas arising from intra-abdominal organs. A 65-year-old lady was diagnosed to have squamous cell carcinoma of lower third of esophagus. She received external radiotherapy and brachytherapy, following which she developed a stricture in the lower third of esophagus. She underwent metallic esophageal stent placement (Ultraflex, covered, 12 mm; Microvasive) with which her dysphagia improved and she gained 7 kg weight over 6 months period.

Two years later she noticed a small nodule in the umbilicus, which started discharging purulent offensive fluid. She also noticed significant anorexia and weight loss. On evaluation, she was pale, emaciated, and had a palpable hard lymph node in the left supraclavicular fossa. An infected swelling was noticed in the umbilical area (3 cm x 3 cm), which was hard, with no cough impulse (Fig). She also had hard nodular hepatomegaly (10 cm below costal margin). Rest of the systemic examination was unremarkable.

Chest X-ray revealed the stent in position. Upper GI endoscopy was suggestive of recurrence of malignancy at the lower end of esophagus. Fine-needle aspiration cytology from the umbilical nodule and supraclavicular lymph node revealed squamous cell carcinoma, similar in morphology to the esophageal lesion. Ultrasonography revealed hepatomegaly with multiple hypoechoic lesions suggestive of metastasis, along with multiple enlarged lymph nodes in the upper retroperitoneum and porta region. She was offered palliative therapy for pain, as she was not willing for any definitive therapy.

Umbilical metastasis accounts for 10% of lesions involving the anterior abdominal wall, and these are usually adenocarcinomas. Clements stated that the finding of a metastatic nodule at the umbilical site almost certainly establishes the inoperability of the patient.

Fig: Ulcerated nodule in umbilicus

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Most of the visceral malignancies that metastasize to the umbilicus are adenocarcinomas. Rarely squamous cell carcinoma of the cervix and penis and malignant mesothelioma have been found to metastasize to the umbilicus.

Umbilicus is an extremely uncommon site for metastasis from esophageal malignancy and has only been reported rarely in adenocarcinoma of the esophagus. In our patient, squamous cell carcinoma of the esophagus had metastasized to the umbilicus. There is no published report of squamous cell carcinoma of the esophagus metastasizing to the umbilicus. Umbilical seeding possibly occurred from the retroperitoneal lymph nodes by retrograde spread.

With increasing survival in patients with cancer due to improved interventions, it would be more likely in years to come to see unusual manifestations of some of these malignancies.