KQ 2. 소아두부외상에서 두부 외상 진단을 위한 적절한 영상검사는 무엇인가?

권고 2-1. 글래스고 혼수척도(Glasgow Coma Scale, GCS)가 14 이상이면서 신경학적 증상이나 징후, 혹은 고위험인자(예: 의식손상, 두개저 골절 의심소견 등)가 없는 두부 외상 소아에서 두부 손상 진단을 위한 영상검사를 시행하지 않는 것을 권고한다. (권고등급 C, 근거수준 I)
권고 2-2. GCS가 13이하이거나 GCS가 14이상이면서 신경학적 증상이나 징후, 혹은 고위험인자(예: 의식손상, 두개저 골절 의심소견 등)가 있는 두부 외상 소아에서 두부 손상 진단을 위한 영상검사로 조영증강 전 CT(non-contrast brain CT)를 고려할 수 있다. (권고등급 B, 근거수준 I)

근거요약

소아의 두부 외상에 대해 검색을 통해 7개의 진료지침을 찾았으며 이 중 4개의 진료지침을 최종 선택하였다(1-4). 이 진료지침들에서의 공통적인 관심사는 경한 두부 손상(GCS ≥ 14)에서의 적절한 영상검사였다. 여러 연구 및 진료지침을 종합해서 보았을 때 경한 두부 손상의 정의는 14 이상의 GCS를 보이는 것으로 함이 적절하다(5). GCS가 14 이상이면서 신경학적 증상이나 징후, 또는 고위험인자를 보이지 않는 경우에 심각한 두부 손상을 보이는 경우는 매우 드물며 임상적으로 의미있는 외상성 두부 손상을 보이는 전체 비율은 0.9%이며 검사나 병력에서 두개 내 이상의 시사점이 없다면 0.05%로 낮아진다(7). 2세 이상의 환아에 대한 PECARN (Pediatric Emergency Care Applied Research Network)의 연구에서 정상적인 의식, 의식소실, 구토, 심한 손상 기전, 두개저 골절 의심 소견과 심한 두통을 기준으로 삼았을 시 99.9%의 음성예상치(negative predictive value), 96.0%의 민감도를 보였다. 2세 미만의 경우에도 비슷하며 1% 미만의 의미있는 외상성 두부 손상을 보이며 의식변화를 보이면 4%, 골절이 의심되면 3.6%로 증가한다. 또한 2세 미만 소아 만 명 이상을 대상으로 한 PECARN에서 정상적인 의식, 의식소실, 전두부를 제외한 두피 혈종, 심한 손상 기전, 만져지는 두개 골절, 부모가 보기에 평소와 같은 행동 등을 기준으로 보았을 때 100%의 음성 예측치와 100%의 민감도를 보였다(7). 두부 CT 1회 촬영 시 0.02~0.1% 암이 증가한다는 점(12)을 포함하여 방사선에 민감한 소아라는 점과 이러한 연구결과를 고려한다면 GCS 14 이상의 경한 두부 손상을 보이는 소아에서는 영상 검사를 시행하지 않는 것이 적절하다.

표 1. Glasgow Coma Scale (GCS)

Category	Adult	Scale	Infant
Eye Opening	Spontaneous	4	Spontaneous
	To speech	3	To speech
	To pain	2	To pain
	No response	1	No response
Best moter response	obeys verbal command	6	obeys verbal command
	Localizes pain	5	Localizes pain
	Withdraws form pain	4	Withdraws form pain
	Flexion - abnormal*	3	Flexion - abnormal
	Extension**	2	Extension
	No response	1	No response
Best verbal response	Oriented and converses	5	Coos, babbles
	Disoriented and converses	4	Cries but consonlable
	Inappropriate words	3	Persistently irritable
	Incomprehensible sounds	2	Grunts to pain/restless
	No response	1	No response

2세 미만에서 두개저 골절이 의심되는 경우 약 7.5%에서 임상적으로 중요한 두부 손상이 있었으며(7), GCS가 낮아질수록 두개 내 손상 확률이 증가한다(33). 따라서 신경학적 증상이나 징후, 혹은 고위험인자를 보이는 경한 두부 손상이나 13이하의 GCS를 보이는 두부 손상 소아의 경우에는 영상검사가 필요하다. 급성 출혈 여부 및 두개 골절을 잘 보여주는 CT와 달리 두개골 단순 촬영은 골절 유무만 보여 주며 CT에서 보이는 골절 중 약 21%가 단순 촬영에서는 보이지 않을 수 있으며, 골절이 없는 경우에도 최대 50%까지 두개내 손상이 있을 수 있다(1,21). 또한 Reed의 연구(20)에서는 단순촬영 없이 병력 청취와 CT만 가지고 검사를 하였을 때 두개 내 손상을 놓치는 비율이나 전반적인 방사선량의 증가가 없었다. 이러한 점을 고려했을 때 신경학적 증상이나 징후, 혹은 고위험인자를 보이는 경한 두부 손상이나 13이하의 GCS를 보이는 두부 손상 환아의 경우에는 CT를 시행함이 적절하다 하겠다. 중등도 이상의 두부 손상에서 미만성 축삭 손상이 약 75%에서 보인다는 보고(17)가 있어 MRI가 필요할 수도 있으나 외상환자에게 MRI를 적용하는 것이 시간상으로 혹은 접근성에 있어 부적절하며 소아에 있어서는 추가적인 진정이나 마취와 같이 조치가 필요할 수 있어 응급 상황에서는 CT가 우월하다 할 수 있다.

권고 고려사항

1. 이득과 위해

소아두부외상환자의 일차 진단 검사로 CT 검사를 사용하는 경우 진단정확도가 높은 장점이 있으나 방사선 피폭의 단점이 있다. 따라서 신체 검진과 병력 청취를 통해 검사를 시행할 환자

를 정할 필요가 있다.

2. 국내 수용성과 적용성(Acceptability and Applicability)

진료지침의 국내 수용성과 적용성은 평가결과 Eastern Association for the Surgery of Trauma Practice management guideline에서 발간한 Evaluation and management of mild traumatic brain injury(2012)와 Scandinavian Guidelines for initial management of minimal, mild and moderate head injuries(2000)의 경우 적용성에 무리는 없으나 연구군이 전반적으로 우리 현실과 맞지 않아 수용하기 어렵다. 나머지 진료지침의 국내 수용성과 적용성에 큰 무리가 없는 것으로 판단되었다. 수용성과 적용성 평가표는 부록에 제시한다.

3. 검사별 방사선량

두부 CT 

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