이식신 조직의 병리

Pathology of Renal Allograft

가톨릭의대 서울성모병원 병리과

최 영 진

1. 이식신 변화를 가장 정확히 알 수 있는 방법의 Gold standard는 병리조직검사이다.
2. 이식신 조직의 적절성 (specimen adequacy): 최소 10개 이상의 사구체와 2개 이상의 동맥혈관이 포함되어야한다. 생검조직이 충분치 않을 경우 진단의 정확성이 떨어지며, 특히 초점성 분포를 하는 병변인 경우는 진단적 오차가 커지게 된다.

> * Adequate : >10 glomeruli with 2 arteries
> Marginal : <7 glomeruli with 1 artery
> Unsatisfactory : <7 glomeruli with no artery

3. 이식신에서 거부반응 및 기타질환의 정확한 진단을 위해서는 LM 및 IF검사 는 반드시 시행하여야 하며, EM도 임상적 상황에 따라 필요한 경우는 시행하여야한다.

이식신 생검의 진단분류- Banff 분류의 변천

이식신 조직의 병리진단학적 분류는 현재 Banff Classification에 따른 분류가 가장 널리 사용되고 있다. Banff 분류는 1991년 Cannada, Banff에서의 모임을 시작으로 "Banff 93 Classification"이 처음 제시되었고, 그 후 "Banff 97 Classification"으로 보완되어 사용되다가, C4d 염색이 체액성 거부반응의 진단에 유용함이 알려지면서 2003년에는 Antibody-mediated rejection의 조직학적 분류가 좀 더 세분화되었다. 최근 2005년 "Banff 05 Classification"에서는 Chronic allograft nephropathy (CAN)가 없어지고, Chronic active Antibody-mediated rejection 및 Chronic active T cell-mediated rejection이 추가되었다. 2007년 "Banff 07 Classification"에서는 active rejection의 소견이 없는 C4d deposition 항목이 추가되었고, C4d scoring, 및 Peritubular capillaritis의 grading이 추가되었다.

The Banff '07 update - Banff 97 classification of renal allograft pathology

1. Normal
2. Antibody-mediated changes (may coincide with categories 3, 4 and 5 and 6)
   - Due to documentation of circulating antidonor Ab, and C4d or allograft pathology.
   - C4d deposition without morphologic evidence of active rejection.
   - C4d+, presence of circulating antidonor Ab, no signs of acute or chronic TCMR or ABMR (i.e. g0, cg0, ptc0, no ptc lamination). Cases with simultaneous borderline changes or ATN are considered as indeterminate.

- Acute antibody-mediated rejection
  C4d+, presence of circulating antidonor Ab, morphologic evidence of acute tissue injury

Type/Grade
I. ATN – like minimal inflammation II. Capillary or glomerular inflammation (ptc/g >0) and/or thromboses III. Arterial – v3

- Chronic active antibody-mediated rejection
  C4d+, presence of circulating antidonor Ab, morphologic evidence of chronic tissue injury, such as glomerular double contours and/or peritubular capillary basement membrane multilayering and/or interstitial fibrosis/ tubular atrophy and/or fibrous intimal thickening in arteries

3. Borderline changes: 'Suspicious' for acute T-cell-mediated rejection (may coincide with categories 2 and 5 and 6)

No intimal arteritis Foci of tubulitis (t1, t2 or t3) with minor interstitial infiltration (i0 or i1) or tubulitis (t1) with interstitial infiltration (i2, i3)

4. T-cell-mediated rejection (TCMR, may coincide with categories 2 and 5 and 6)

Type (Grade)
IA Significant interstitial infiltration (>25% of parenchyma affected, i2 or i3)+foci of moderate tubulitis (t2) IB Significant interstitial infiltration (>25% of parenchyma affected, i2 or i3) + foci of severe tubulitis (t3) IIA Mild-to-moderate intimal arteritis (v1) IIB Severe intimal arteritis comprising>25% of the luminal area (v2) III 'Transmural' arteritis and/or arterial fibrinoid change and necrosis of medial smooth muscle cells with accompanying lymphocytic inflammation (v3)

- Acute T-cell-mediated rejection
- Chronic active T-cell-mediated rejection 'chronic allograft arteriopathy' (arterial intimal fibrosis with mononuclear cell infiltration in fibrosis, formation of neo-intima)

Grade
I. Mild interstitial fibrosis and tubular atrophy (<25% of cortical area) II. Moderate interstitial fibrosis and tubular atrophy (26-50% of cortical area) III. Severe interstitial fibrosis and tubular atrophy/loss (>50% of cortical area)

5. Interstitial fibrosis and tubular atrophy – no evidence of any specific etiology. (may include nonspecific vascular and glomerular sclerosis)
6. Other: Changes not considered to be due to rejection.
   (may include isolated g, cg or cv lesions and coincide with categories 2, 3, 4 and 5)

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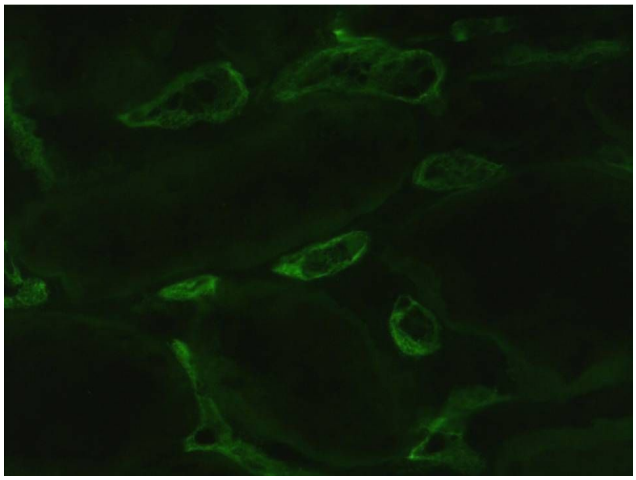

Fig. 1. Positive C4d reaction in peritubular capillaries, IF stain (×400).

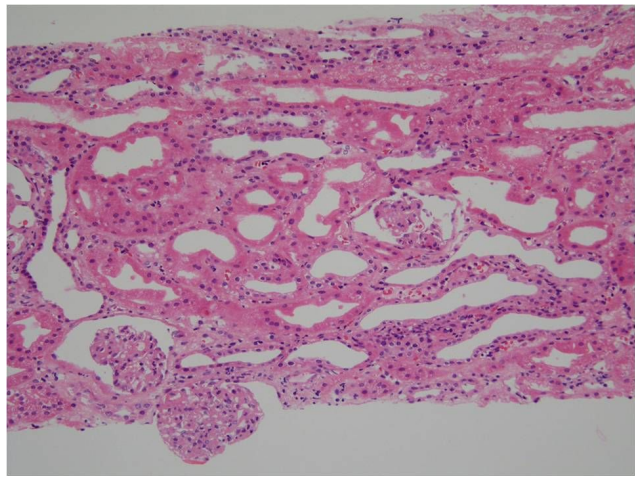

Fig 2. Acute AMR, Type I, ATN-like (×100).

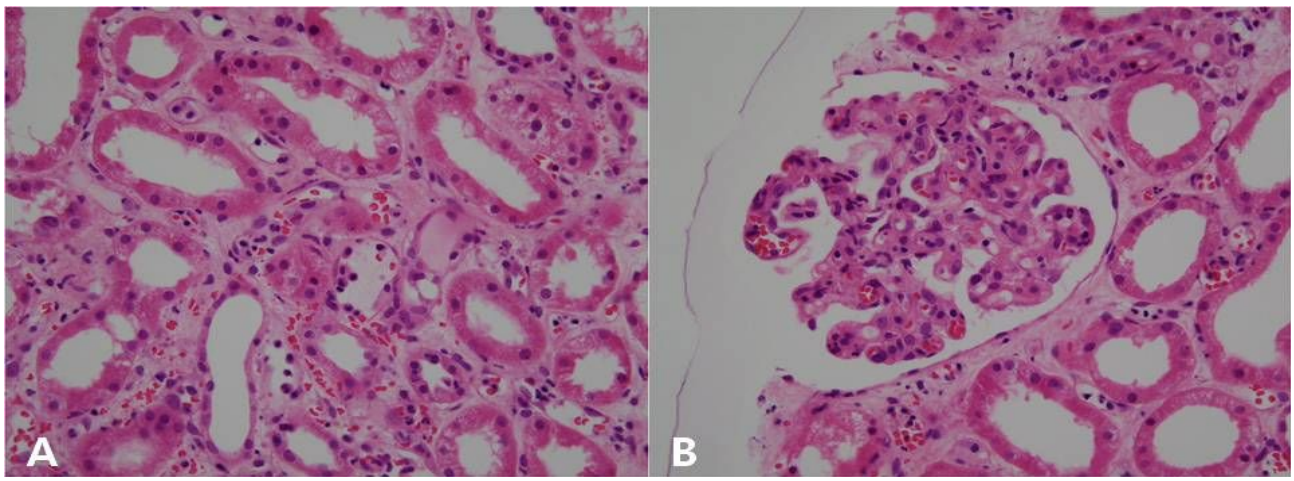

Fig. 3. (A) Acute AMR, Type II, capillaritis (×400). **(B)** Acute AMR, Type II, glomerulitis (×400).

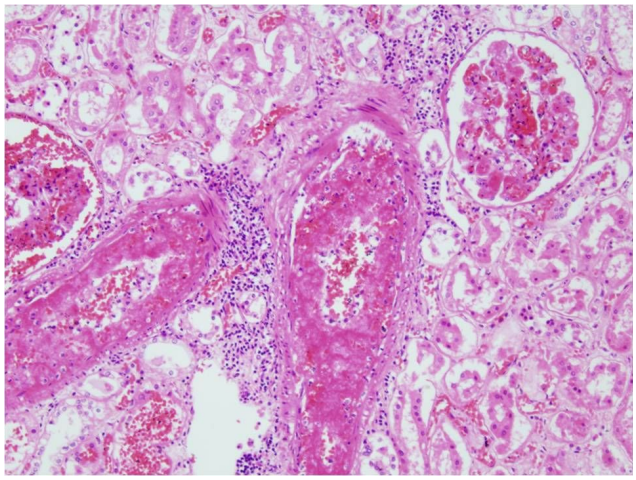

Fig 4. Acute AMR, Type III (×200).

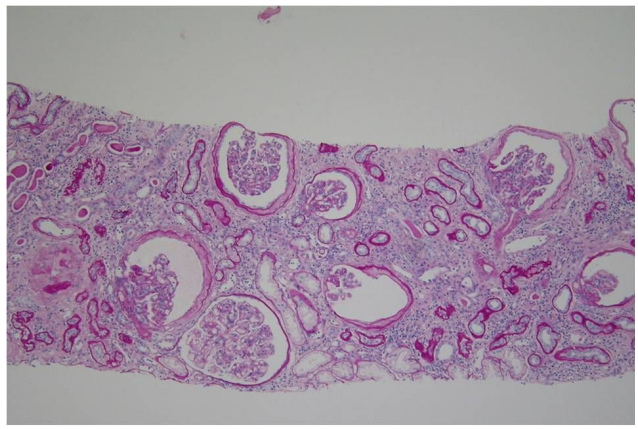

Fig 5. Chronic active AMR (×100).

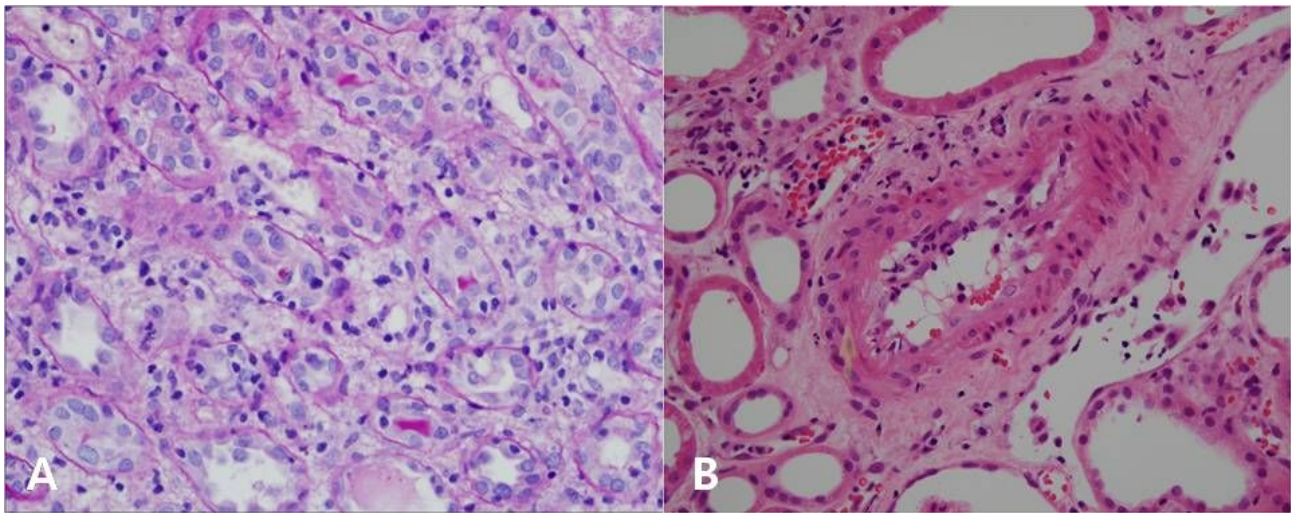

Fig 6. (A) Acute T-cell-mediated rejection, type I (×200). **(B)** Acute T-cell-mediated rejection, type II (×200).

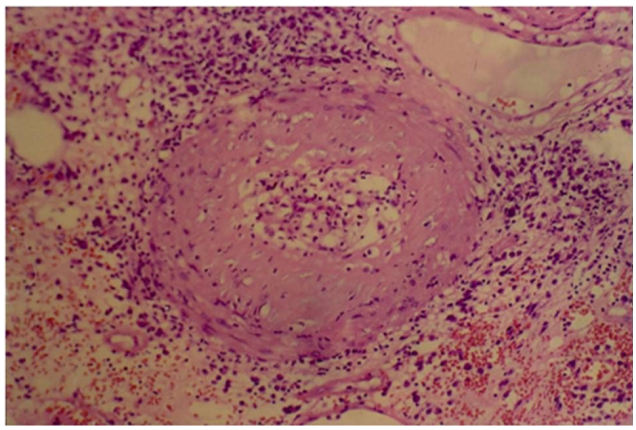

Fig. 7. Chronic active T-cell-mediated rejection (×200).

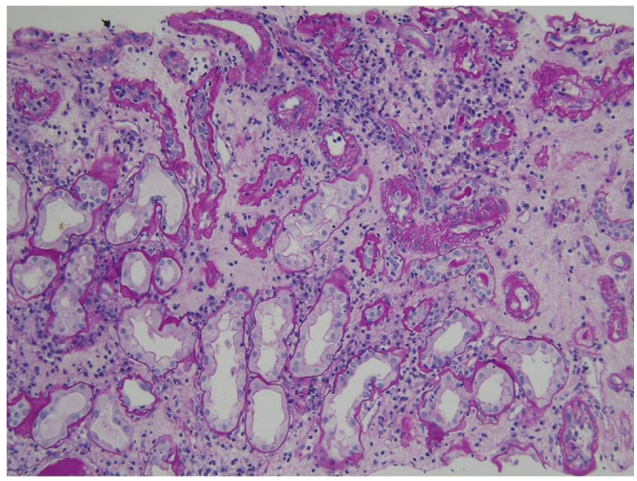

Fig. 8. Interstitial fibrosis & Tubular atrophy (×100).