

# Imaging studies to diagnose necrotizing fasciitis: a noninvasive approach for clinician

## Opinion

Necrotizing fasciitis is often a challenging clinical diagnosis. Using a variety of imaging techniques the task could be accomplished. This would help at diagnosis and management; aiding surgeons to exclude other impersonators of necrotizing fasciitis and to demarcate dissection margins tediously.<sup>1</sup> Imaging modalities commonly employed for diagnosing necrotizing fasciitis include XRAY, US, CT and MRI. Unfortunately, radiologic findings on plain radiographs become apparent after the necrotizing fasciitis has advanced, causing soft tissue emphysema along fascial planes.<sup>2,3</sup> With plain radiographs, soft tissue gas is the singular specific sign of necrotizing fasciitis but it is only seen in infections with gas forming organisms. Presence of subcutaneous gas is a specific, but not a sensitive finding, positive in fewer than 25 percent of cases.<sup>4,5</sup> Plain radiographs demonstrate non-specific findings of soft tissue swelling and edema which mimic cellulitis and myositis. So, plain radiographs have inadequate value in the diagnosis of necrotizing fasciitis. In fact, plain radiographs may delay the diagnosis of necrotizing fasciitis.<sup>6</sup> Ultrasonography can be useful in necrotizing fasciitis as it can determine abscess formation, subcutaneous emphysema along the fascial planes, swelling and dense echogenicity of fatty tissue with interlacing fluid collections. This allows prompt surgical intervention.<sup>7,8</sup> CT scan, alternatively, shows dilution of soft-tissue, fat stranding and inflammation, and fluid or air in fascial planes but absence of these features cannot exclude necrotizing fasciitis.<sup>9</sup> Furthermore, CT replaces XRAY for two reasons as it is swift in emergency settings and accurately evaluates the extent of bone and tissue involvement. CT is 80 percent sensitive for detecting necrotizing soft tissue infections.<sup>10,11</sup> However, CT findings are minimal early in necrotizing fasciitis.

For detailed evaluation of soft tissue infection, MRI is modality of choice. MRI is favored because of its spatial resolution and multiplanar capabilities. In a study by Rahmouni et al.<sup>12</sup> the MRI was useful at differentiating non-necrotizing cellulitis that was treated medically from severe necrotizing fasciitis which required aggressive surgical intervention. MRI T-1 images,<sup>13</sup> absence of gadolinium contrast enhancement could reliably detect fascial necrosis requiring surgical debridement. In a study by Brothers, Thomas E et al.<sup>14</sup> MRI was found to be convenient in determining the extent of necrotizing fasciitis and accurately predicted necrosis or pyomyositis as compared to myoglobinuria or elevated creatine kinase or lactate dehydrogenase. Surgical debridement was not performed short of MRI evidence of necrosis. When MRI is combined with clinical assessment, it could aid in determining the need for surgery and debridement.<sup>12-14</sup> Magnetic resonance imaging differentiates between necrotizing and non-necrotizing fasciitis of the lower extremity. T2 hyper intense signaling in the deep intermuscular fascia is a significant finding for the diagnosis of necrotizing fasciitis. Variable contrast enhancement, most commonly a mixed pattern is usually seen in necrotizing fasciitis. The sensitivity of MRI is 100% and specificity is 86%. Necrotizing fasciitis shows necrosis and inflammation of fascia, leading to inter fascial fluid and hyperemic changes around fascia, resulting in hypo intense signal on T1 weighted and hyper intense signal on T2 weighted

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images, with variability in contrast enhancement.<sup>15,16</sup> It is particularly useful when nonspecific signs of sepsis are seen. However, signal abnormalities in deep fascia are non-specific for necrotizing fasciitis as these can be seen in non-necrotizing fasciitis, inflammatory fasciitis, radiation induced changes and trauma.<sup>17</sup> Moreover, MRI itself is time-consuming, costly and delays treatment as sensitivity of MRI exceeds its specificity. We encourage clinicians to opt for MRI cases of necrotizing fasciitis.

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## Conflict of interest

The author declares no conflict of interest.

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